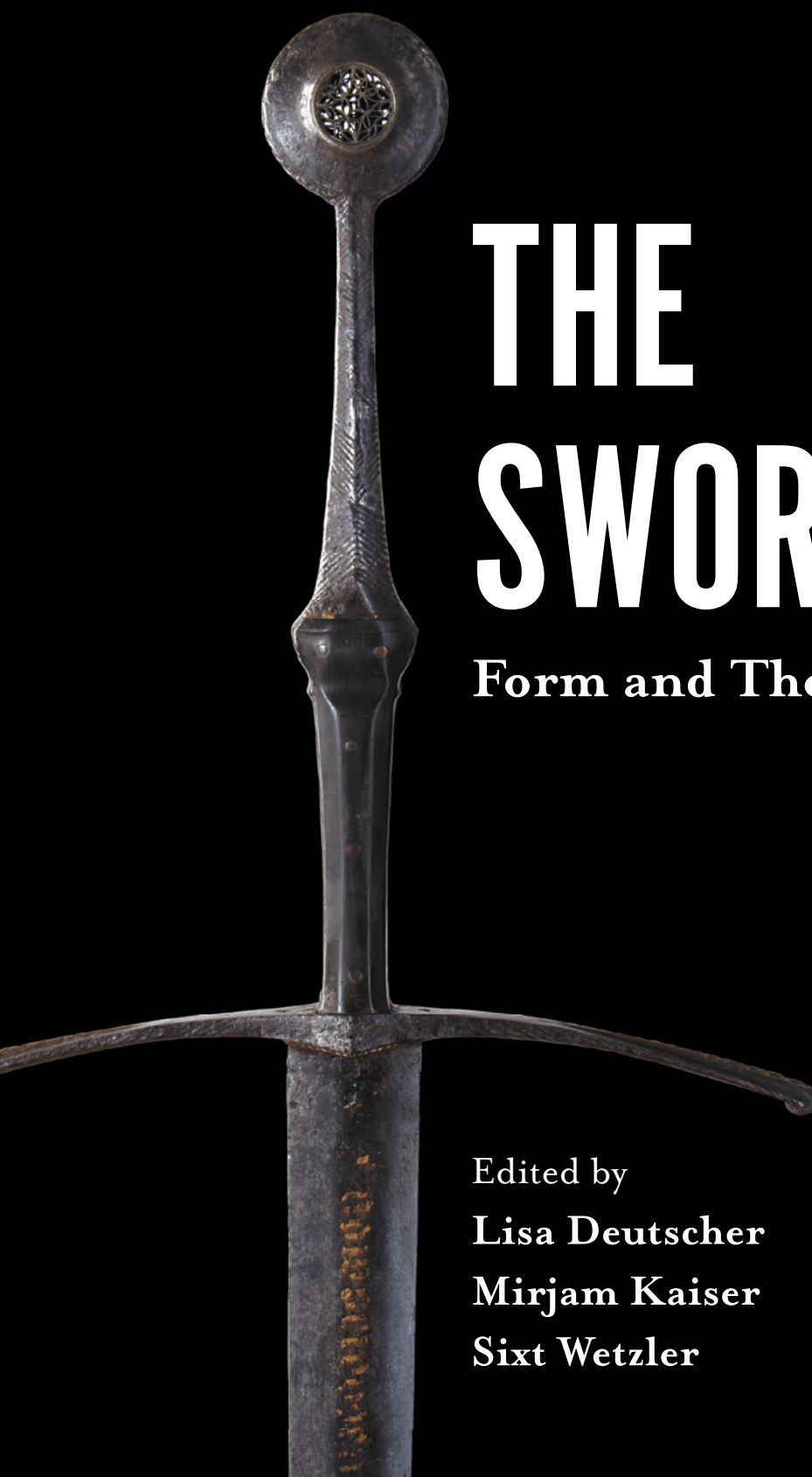




THE SWORD

Form and Thought

Edited by
Lisa Deutscher
Mirjam Kaiser
Sixt Wetzler

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The Sword: Form and Thought

Armour and Weapons

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19/20 November 2015

Deutsches Klingenmuseum Solingen

Editors

Lisa Deutscher

Mirjam Kaiser

Sixt Wetzler

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Foreword

WHILE ENTERING THE CITY of Solingen on your way to the Deutsches Klingenmuseum, the German Blade Museum, you will see the words “*Klingenstadt Solingen*” written on the town sign: “The City of Blades, Solingen”. This sounds like an official title, but it is also meant to evoke a specific narrative of the region, the town and its edged weapons and cutlery. This story, which began in the fourteenth century, continues today. It tells of the history of the first smiths, of their coveted blades found in the armouries of monarchs and rulers all over Europe, and of the magic words “*ME FECIT SOLINGEN*”. It tells of the sign of the running wolf, of privileges for blade makers’ guilds, or of the Solingen swords that were crossed on the battlefields of European wars. It is the story of overseas exports, of the weapon smiths of the German Empire, and of modern-day fencing blades; a narrative not short of dramatic episodes. And it lives on even though the manufacturing of blades has lost much of its significance for the city since the structural changes in the 1970s.

The German Blade Museum is the place where this story is not only preserved, but also continued. Whenever people take the objects of the collection as the direct focus of their research, the tale goes on.

In this regard, the conference *The Sword – Form and Thought*, held on the 19 and 20 November 2015 during the exhibition of the same title, was a true “festival of storytelling”. It underlined the Blade Museum’s role, both in Solingen and beyond, as a centre for research, reflection and debate about blades. Furthermore, the excellent contributions and the lively discussions brought new inspiration to the museum and allowed for fruitful networking.

The German Blade Museum wishes to express its gratitude to all the speakers of the event for sharing the results of their research. I would like to personally thank Lisa Deutscher, Mirjam Kaiser and my colleague, Dr Sixt Wetzler, for the idea to bring the conference to this museum, for the concept of the event and its organisation and for making this publication possible.

Dr Isabell Immel
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Preface

THE SWORD HAS ACCOMPANIED human civilisation since the Bronze Age. Treasured both for its functionality as a weapon and its symbolic power, we have never lost our fascination with it. Even though now obsolete in military terms, it remains part of the insignia of soldiers all over the world. Together with the scales, it is recognised as a symbol of justice. It is featured in national flags and coats of arms. Just as in the literature of earlier centuries, modern pop-culture puts the sword in the hands of the righteous hero and villainous antagonist, most famously in its incarnation as the lightsaber. Martial arts and combat sports concentrate on the use of the sword, be it the Japanese national sport of kendo, Olympic fencing, or the quickly growing community of Historical European Martial Arts. Antique originals and high-quality replica swords are sought-after items among enthusiastic collectors.

But from what springs the fascination that the sword holds for the human mind? Fundamentally, from its materiality. A polished blade of metal, be it bronze or steel, is an object that transcends ordinary experiences; reflecting the sun, it resembles a ray of light held by the hands of its wielder. Its sharp edges threaten and attract at the same time. A child learns to fear the blade from the first time of being cut, a fear that soon becomes intuitive, like the fear of fire. Yet at the same time, children love to hold a blade in their hand: the blade promises empowerment, a possibility to change and dominate the world around them. The promise stays with them while they grow older; once taken in the hand, the sword seems to bestow an aura of invincibility to its wielder. An aura which is sometimes paid for with the horror the weapon instills in those it threatens. The sword is, one could say, an answer to our fear of our own weaknesses – even if that means to project the fear unto others.

All of this results in the sword's reputation as the "Queen of Weapons" through the millennia and across the continents. Given its outstanding status in human culture, it is no wonder that the weapon, its production, symbolism and usage also attracts the attention of researchers from various academic backgrounds. The volume brings together several such approaches to the history and meaning of the sword. It cannot fulfil the role of a complete technological, cultural and military history of the sword. But it will present to the reader an insight into various topics currently discussed in sword research, from the critique on established typologies via the use of computed tomography for sword reconstructions to the linguistic analysis of early modern fencing literature to name but a few.

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The articles are based on the papers presented at the conference *The Sword – Form and Thought*, held on 19 and 20 November 2015 at Deutsches Klingmuseum Solingen (the German Blade

Museum), and organised by this volume's editors. Of the twenty-two papers given by researchers from nine different countries, sixteen are presented here. The six remaining papers were "The Hand of the King? The Sutton Hoo Sword and the Man in the Mound" by Sue Brunning, "How to Handle a Long Sword and How to Use a Fight Book?" by Eric Burkart, "The Long, Long Ricasso: Two Swords (and a Half) from Burgundy" by Fabrice Cognot, "On the Geometrical Construction of the Medieval Sword" by Peter Johnsson, "Analysis of the Persian Shamshir" by Manouchehr Moshtagh Khorasani, and "Medieval Swords from the Ljubljana River" by Tomaš Nabergoj.

The book's order of articles follows the four main themes "typology and classification", "metallurgy and production", "symbolism and reception", and "fighting and swordsmanship":

TYPOLGY

On an immediate level, typologies serve as conventions of communication. Imperfect as they may be, they provide terminological shortcuts, facilitating academic exchange. The growing, multidisciplinary interest, however, causes terminologies from different fields to collide. Conferences like *The Sword – Form and Thought* can help us find a common language to speak about the sword. Whether this dynamic process should also be a means to develop a universal "super typology", however, is questionable. After all, at a second level, any typology is an attempt to bring theoretical order into the chaos of a perceived reality, and the urge to arrange reality in a proper order has sometimes led to "typology for the sake of typology", and to evolutionistic oversimplifications. The inclusion of fakes, reproductions, and composites into some typologies has worsened the situation, while only few typologies attempt to include all three: the materiality, the aesthetic design, and the combat characteristics of the swords. It remains debatable in how far such a complete perspective is achievable. On the contrary, instead of regarding typology as an end in itself, and modelling research questions around existing typologies, they should rather be applied as adaptable tools to given problems.

METALLURGY AND PRODUCTION

To fully understand a sword, the thorough evaluation of its material properties is just as crucial as that of its temporal and cultural context. The materiality of a sword determines how it can be used in combat. At the same time, it also defines how the weapon will be perceived and valued by those around it. Therefore, production and materiality are not exclusively based on the intended functionality, but are also subject to both traditional and contemporary influences. Hence they may undergo changes that cannot always be explained only with practical considerations. In the attempts to identify or tell apart (pre-)historic workshops, such changes in materiality and production can provide essential information beyond the commonly applied criteria of style and decoration. Today, archaeological research shies away from invasive analysis: instead, modern, non-invasive methods like X-ray and CT scans can provide detailed results without damaging the objects. To avoid hasty conclusions, such an analysis should always consider both micro- and macrostructure of a sword's material.

SYMBOLIC MEANING AND CULTURAL PERCEPTION

Our modern perception of what a sword “means” is influenced by romantic images of the nineteenth century, and its ideas about chivalry and the “noble knight”. It is difficult yet necessary to leave these modern notions behind when assessing weapons of the distant past. For example, there is a tendency in prehistoric archaeology to interpret the presence of a sword in a burial assemblage as a marker of elite social standing. The access to and distribution of weapons in a community, however, might also have been governed by factors that do not necessarily connect weapon bearing and high social class.

Further hints to a sword’s connotations at any given time may also be found in its decoration, or lack thereof. Often swords are found to carry religious or other symbols, commonly interpreted as invocations to protecting forces in times of battle. Other decorations may serve to emphasise the bearer’s wealth or earthly power. Thus, the sword, today mostly a symbol of power and justice, may often have served as a bearer of symbols that add another meaning to itself and its wielder.

FIGHTING AND SWORDSMANSHIP

The research of historical martial arts techniques faces massive methodological problems, as far as their physical practice is concerned. There is an obvious epistemological limit: skills of the body cannot be transmitted solely by written or pictorial sources, but need face-to-face mediation by an already skilled person. Without the consideration of such implicit or tacit knowledge, any interpretation of medieval and early modern fight books, to give one example, remains incomplete. Even explicit written and pictorial instructions remain difficult to interpret, as they are both dependent on linguistic contexts and aesthetic norms, and not free from errors. Experimental archaeology can be a parallel strategy to approach combat techniques of the past – especially when working on eras without written descriptions of fighting – but must be executed within a strict methodological framework to yield reproducible results.

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The editors of this book hope that the collected articles will be able to demonstrate two things: on the one hand, that the multidisciplinary approach towards the sword is extremely fruitful for all researchers involved. Questions regarding the swords of one time and area are often also valid for swords from a different background, and answers, once found, can be applied *mutatis mutandis* to both groups. On the other hand, it is obvious that a single, “unified theory of the sword” cannot yet be formulated, and likely never will be. The sword is an archetype in itself. At the heart of this archetype lies a shared functional and symbolic potential, but different times and different cultures have processed and interpreted this potential in countless different ways. Thus, the volume aims to demonstrate both: the consistency *and* the diversity of the sword, of the forms it takes and the thoughts it provokes.

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I

Typology

“What is the Riddle of Steel?”

Problems of Classification and Terminology in the Study of Late Medieval Swords

Iason-Eleftherios Tzouriadis

IN RECENT YEARS THE medieval sword has become increasingly popular as a research topic. Authors such as Petersen, Oakeshott, Geibig, Wheeler, and many more have produced classification systems which are used by modern researchers to categorise and investigate medieval swords. This essay examines the problems of classifying medieval swords and the research questions raised by the terminology used to create the different categories. Although the classification of medieval swords covers a broad chronological range, this paper principally examines these problems in relation to swords from the fourteenth and fifteenth centuries, using them to demonstrate how these problems are caused and the reasons behind them, as well as why they are augmented in the aforementioned period. The merits and flaws of constructed original classification systems developed in modern scholarship are also briefly addressed, and whether or not they can be useful tools or obstacles in curatorial work and academic research. Finally, a short discussion will investigate if there are ways to make research easier by adopting simpler classification systems, by replacing numerical and/or alphabetical nomenclature with a descriptive terminology, and why a new, modern classification system in the form of a database is necessary.

The aim of this paper is to discuss certain problems that often appear and persist in the study of swords, specifically those revolving around the creation and application of classification systems. It is a theoretical approach to a theoretical subject, adopted in an attempt to question and solve a practical research issue. An important mention to make at this point is that this type of problem, and generally problems of classification, typology, and terminology, do not only appear in the study of swords, but also in the research field of arms and armour as a whole. Most edged weapon categories from this period (c.1300 to c.1550) can be approached in a similar way, and the thoughts presented here can be applied to them as well. This paper will highlight such problems, which when dealing with late medieval swords are augmented because of the popularity of the weapon, both in its original context as well as a modern research topic. Popular methodological approaches will be examined briefly, and finally, thematic routes and new trends of research will be presented.

The reasoning behind the chronological framework of this paper first needs to be explained. Most problems in the study of edged weapons, and specifically swords, persist throughout the Middle Ages, and the same can be said for the methodological approach in modern scholarship. The main differentiating factor between swords from before and roughly after 1300 is the information available. Records contemporary to the objects can be found more often in areas with a consistent tradition in the craft of arms and armour, and usually a consistent archival system such as Germany, Austria, northern Italy and Switzerland. These records, depending on the nature of the document, can provide a variety of information which includes the quantity of production, the person and/or faction that commissioned the manufacturing of single or multiple weapons, and insight as to the use of specialised craftsmen for different parts of the weapon (hilt and blade). Most importantly of all, they can be used in combination with other sources, from public documents to chronicles, to understand why the objects were commissioned in the first place. This type of research can also help in adjacent areas of study, such as the social and military structure of a specific geographical area during a limited period of time.

The two research trends that will be examined in this paper are the over-classification of weapons into small categories based on physical features and the idea of sword “evolution”. The classification and typology of swords is possibly a cause of excitement or horror for most scholars who deal with the subject. Generally, the term “typology” will be avoided in this essay, but when used it refers to the corpus of terminology rather than a classification system, to avoid confusion with the latter. Different classification systems for medieval swords, either broader or more specific, have been created since the early twentieth century, with some of the most popular including those suggested by Petersen, Wheeler, Norman, Hoffmeyer, Oakeshott, Behmer, Geibig and many more.¹ Depending on the author, these classification systems followed different rules: most used the form of the weapon or its individual features to attach it to a certain category. Some of the aforementioned authors also created separate systems for pommels and cross-guards, which was necessary to avoid complications with swords surviving with hilts of different dating.² Petersen’s classification has possibly been the most influential on later works, as he thoroughly cross-examined a variety of specimens limited to a certain geographical area, and besides his classification produced results concerning the manufacturing and dating of swords; a standard and a methodology that can

¹ In the study of swords, the writers mentioned are considered giants, with works such as: Behmer, *Zweischneidiges Schwert*; Geibig, *Morphologische Entwicklung*; Norman, *The Rapier and Small-Sword*; Oakeshott, *Records of the Medieval Sword*, and Wheeler, *London and the Vikings*. These works are connected, founded upon Petersen’s research and classification system. However, they differentiated and expanded in different areas, such as Geibig, who attempted to bridge the chronological gap of the German sword after the tenth century, or Oakeshott who revisited evolutionary ideas and made this research area popular to a wider audience.

² In contrast to his predecessors Marek utilised Petersen’s work, but he raised many questions concerning the technical characteristics as well as the very nature of the sword as an archaeological find, a modern approach that left the space of research explored by earlier scholars. Marek, *Early Medieval Swords*, p. 20.

even be traced nearly a century later in works such as Marek's.³ Oakeshott's works on the sword have been popular, especially amongst martial arts and arms and armour enthusiasts, perhaps because it is the most comprehensive work dealing with technical features of swords. Oakeshott's contributions to sword research and generally to the field of arms and armour have been significant, but it is necessary to mention some significant flaws that affect the quality of his work. It is often hard to track the sources and evidence that Oakeshott used because of his lack of references. Additionally, Oakeshott, more than anyone else as popular in his field, unknowingly made use of swords that were fakes and/or reproductions, or misdated: a problem that of course dilutes the data when it comes to cataloguing, and even more so when a whole sword category is based on them. The same problem occurs when swords composed of parts from different periods are not identified. Claude Blair harshly criticised Oakeshott's research for the last two problems.⁴ It is important to mention here that arms and armour studies by several authors have suffered from the same pathologies (and that it was not only Oakeshott, but he was just the one who took heavy criticism for accumulated mistakes), which is most likely because of the requirements and expectations that come with the definitive nature that a classification system ought to have.

NARROW CATEGORIES WIDE OF THE MARK?

The primary concern regarding classification in small categories based on details and individual characteristics is if there is an actual value to this, and who benefits from this process. Is the use of a typology such as "Petersen Type F" or "Oakeshott Type XIX.1" useful on any level? Of course, such a methodological approach can be useful for experts and/or curators, but it does not seem to provide anything that a well organised catalogue entry could not cover other than providing, at the very best, an extra label. Additionally, it must be taken under consideration that most classification systems are not identical. Even in the case of those built as part of an ongoing network of research, the use of the aforementioned labels implies that a researcher or reader is aware of the classification system and has access to a reference guide.

At this point it is necessary to clarify that the problems with the examined classification systems mainly apply to those dealing with the sword as a complete object, considering it as a composite creation of different parts, and not as an individual with specific technical

³ Petersen, *De Norske Vikingesverd*.

⁴ The main criticism related to the (mis)identification of the swords of Edward III and the Black Prince, which also opened the discussion of how certain mislabelled objects affect data. Claude Blair initially criticised Oakeshott's identification of the swords, and this led to a heated three-part correspondence over the course of nearly two years. Regardless of the authors' specific arguments, the problems discussed in the main text of this essay came up, and Blair refused to adopt the suggested continuation of Oakeshott's system on Petersen's work. Blair, "The Swords of King Edward III and the Black Prince"; Oakeshott, "The Swords of Edward Third and the Black Prince"; and Blair, "The Swords of King Edward III and the Black Prince: A Final Word".

features. The main problem with this classification is that in most cases the groups of swords are broken down into categories so narrow that only one sword fits the profile; most likely because the category was built around that object. Swords are often pushed into categories such as this by scholars falling into the trap of finding patterns simply because they are looking for them. An additional problem which has been previously mentioned, and raised by Blair, is that many of these categories have been based on objects that later proved to be fakes, reproductions, or misdated in order to fit a certain profile. On the same point, the estimated dating and geographical origin of some weapons have changed through the years, something that potentially affects the previously established categories. Finally, the over-classification of swords into narrow categories based on individual characteristics has the great flaw of not taking under consideration or explaining (in most cases) the geographical and chronological distribution of every type; since there is no comparison to other sources this leads to creating types and entries missing key elements of identity. This final issue is augmented and exposed by the previously mentioned issue of access to further information about late medieval swords compared to earlier examples and should not be ignored. Perhaps the all but obsessive classification of weapons from earlier centuries into sub-categories is a result of a stale research climate, partially because of the lack of data. But in the case of late medieval swords many authors did not make use of the potential their material has, as will be discussed over the course of this article.

BASHFORD DEAN AND THE PROBLEM OF WEAPON EVOLUTIONARY THEORIES

The second but equally important research trend to be examined in this paper, which needs to be addressed when studying the (dry) typological analysis and classification of arms and armour in general, and more specifically swords, is the origin of these methodological approaches, and how they have affected modern scholarship. Nearly every publication on this subject will either mention or include one of Bashford Dean's wonderful tables from the first quarter of the twentieth century, whose views and presentation of arms and armour has significantly affected the relevant bibliography.⁵ This influence is often subtle but there are cases of scholars or amateurs dealing with this subject where his approach echoes throughout later writings, such as in the case of Oakeshott; this can also be seen when making an analogy with respective works on other weapons, such as those dealing with the form of certain staff weapons.⁶ Dean's work on arms and armour was phenomenal for his time, and the manner in which he presented it is appealing to the

⁵ Dean included such illustrations made by Randolph Bullock in most of his works for most categories of arms and armour. For a comparison of different tables by Dean and Bullock see Dean, *Catalogue*, p. 7, fig. 2, and p. 66, fig. 7.

⁶ In the detailed article on the glaive and bill Puricelli-Guerra includes a refined modernised version of Randolph Bullock's evolution tables designed by Mario Scalini, which demonstrates the parallel development of the two weapons. Puricelli-Guerra, 'The Glaive and the Bill', p. 5.

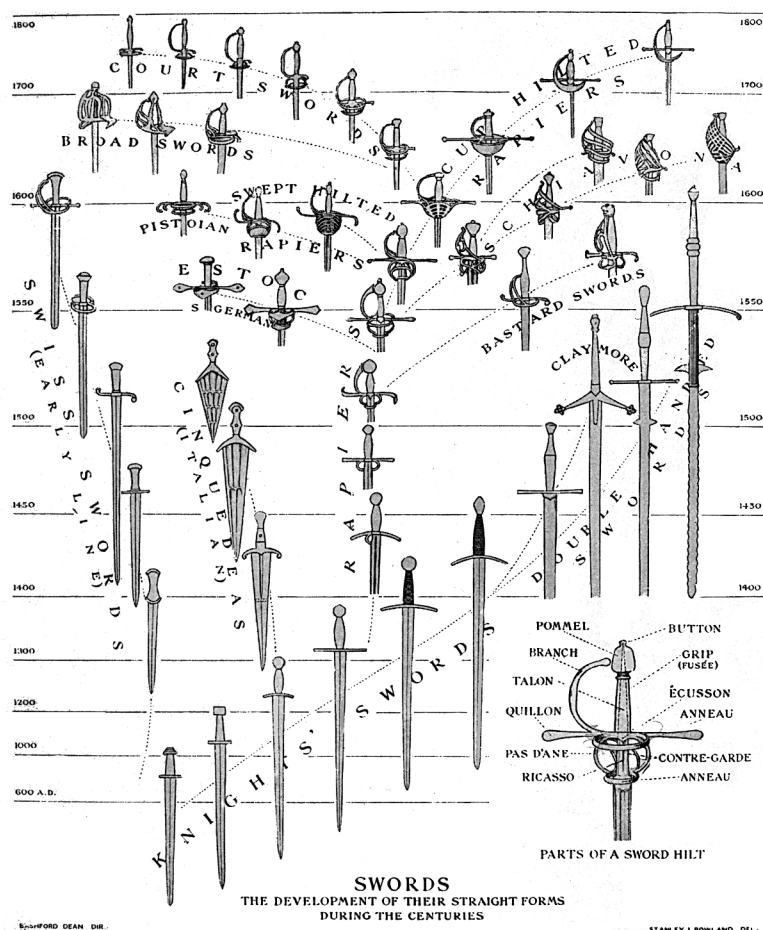


FIG. 1: Sword evolution tree by Bashford Dean.

viewer, especially in the form of the aforementioned tables. To further understand Dean's approach, it is important to take under consideration two factors; firstly, that he was primarily an ichthyologist, and secondly, that his research was conducted at a time when theories revolving around evolution and epistemological methodologies were a popular trend in academic communities. This Victorian perception of classification, combined with the need to fit arms and armour in the same "evolutionary model" of the time as living organisms, led to the creation of those tables which depicted them evolving and branching out their physical characteristics in a linear manner.

Tracking down the source of this methodology, or at least the mind-set behind its application, can not only help to better understand the way sword research has developed, but also to identify problems that have not, or cannot, be addressed. Unfortunately, the

suggested linear evolution would be acceptable if there was a geographical proximity, but it is possible within the framework of the “evolutionary” typology to skip a step or two to go straight to a different form in different areas. This hypothesis puts in question the continuity of a weapon’s “family”, and to what extent similar weapons can be connected to each other based on their form. Of course, arms and armour do evolve, or even better develop, and they do so in conjunction with each other. Their evolution, however, is a product of necessity and technological progress; they cannot be compared and studied in a manner analogous to the evolution of animals or plants.

CLASSIFICATION SYSTEMS OR BROADER RESEARCH

Having briefly considered some of the problems of a closed and technical classification system, perhaps a non-definitive classification with simpler groupings has more room for trial and error. In their research, writers such as Bruhn Hoffmeyer or Wagner have used previously established classification systems, but only as a supplement.⁷ Their works are based on an analysis of the object, its context, and its use, but at the same time they also focus on physical details. In his more general work Seitz focuses on the social and technological context of weapons and their use rather than going in to detailed descriptions.⁸ The same pattern of research can also be observed in more recent works such as in DeVries and Smith’s *Medieval Military Technology*, an example of a less specialised approach regarding specific weapons, but comprehensive and thorough nonetheless.⁹ Methodologically, these works are valuable to a wider audience and provide a variety of information, which again varies in quality and depth.

One of the most obvious and confusing issues of late medieval swords is that their form changes and varies from the fourteenth to the end of the fifteenth century. This is mainly based on geographical criteria. Sword vocabulary revolves around types such as the “longsword”, the “messer”, the “arming sword”, the “two-handed sword”, and their sub-variations. They can be found in different quantities used on the battlefield or depicted in art all over Europe. These weapons had a specific use, and when examined separately the principles of their use change little depending on the precise shape of their pommel or cross-guard. Once again making an analogy with staff weapons, and using Mario Trosó’s monumental work on them, staff weapons are separated into categories and sub-categories based on how their technical features were used.¹⁰ Even when the author plunges in depth into the study of bills, the classification part of the work is brief and only used to discuss

⁷ Classification methods are mentioned in their works but they are rarely discussed in the context of their research. Hoffmeyer, ‘From Medieval Sword to Renaissance Rapier’, and Wagner, *Cut and Thrust Weapons*. Especially Hoffmeyer’s approach was groundbreaking for its time, as the author considered the context of use and production of the weapon as well as its form.

⁸ Seitz, *Blankwaffen I*; *Blankwaffen II*.

⁹ De Vries and Smith, *Medieval Military Technology*.

¹⁰ Trosó, *Le Armi in Asta*, pp. 21–49.

the chronological spread of the weapon. So why should the popularity of the sword as an object in its historical and research context affect methodology in a different way, and why not try a similar approach such as Trosó's, or perhaps something completely new?

INTERDISCIPLINARY APPROACHES AND SUGGESTIONS

Of course the study of the technical characteristics of a sword is important and useful on different levels but there are areas of research with potential far greater than simply looking into sterile classification systems. Some research has been done throughout the twentieth century on the manufacturing and makers of late medieval swords, but it does not appear to be a recurring trend and varies greatly in quality.¹¹ Furthermore, the symbolic use of swords on a religious and political level is an intriguing subject that is worth investigating further, given the surviving documentation and art, which is also connected to their socio-economic context and status.¹² Finally, the interpretation of sword use is a complicated subject when it comes to warfare as natural motions and actions are rarely described in narratives; art, medieval martial arts, and fight books might however be the solution to interpreting late medieval sword use. After exploring their use through different research routes, it will perhaps be possible to suggest and produce a more holistic and organic classification system based on an interpretation of utility rather than the external observation of physical features. After all, the form of the sword however it developed, from a longsword to a rapier, was usually entwined with its use.

This article should not be seen as a polemic against the general use of sword classification systems. It has not been suggested that classifying late medieval swords should be avoided, and it cannot be stressed enough that the problems presented here apply mainly to swords dated after the thirteenth century, due to the quality and quantity of extra information we have compared to objects from earlier centuries. The main reasoning behind the use of the already established classification systems, and the initial need for their development, is the need for a common language between researchers. A great example of the use of even a flawed system is the communication and immediate understanding of people conducting studies on different geographical areas. Aleksić, in his book on swords from south-eastern Europe, introduces researchers that usually look at western material to a whole new pool

¹¹ Sword manufacturing is a popular area of research and the quantity of studies varies as much as the quality. Research has been conducted under the prism of different disciplines and interests, from academic-level studies, to companions of blacksmithing. Some popular readings that represent that variety are the following: Williams, 'Methods of Manufacture of Swords in Medieval Europe', and Bezdek, *German Swords and Sword Makers*.

¹² Jones' work on martial display is a pivotal point on the multi-dimensional discussion of the function of weapons both on a practical as well as on a symbolic level. His methodology combined surviving material culture, contemporary texts, illustrations, and secondary works in a modern interdisciplinary mosaic, which might well be one of the ways forward in the study of edged weapons in general. Jones, *Bloodied Banners*.

of data, and he does so by using the categorisation and classification discussed earlier (Oakeshott, etc.), which makes it easier to follow and make some immediate comparisons.¹³ Having mentioned this, as a research community, students of swords from every discipline should not follow the norm, and constantly question typologies, classification systems, and research categorisations in the pursuit of new approaches that might generate new questions and therefore new answers. For example, in contrast to letters and numbers used in a way to pin-point swords like butterflies in an old-fashioned Victorian collection, Peter Johnsson's geometrical approach has combined different disciplines and produced a whole new way to view and examine swords; a methodology that can even be expanded to other edged weapons and one that creates distinct and wide sword categories based on mathematics, geometry, and even music.¹⁴ These categories and schematics are often named after their distinct shapes as demonstrated through geometrical designs. In addition to this, the author describes the vibration and other dynamic properties of different swords by building on his aforementioned geometrical schematic representations.¹⁵ Johnsson's nearly alternative classification is based on specific traits and methods of examination, but it creates a wider than usual space where objects fit in, and is therefore safer to use than older systems that ignore or misuse these features. Most importantly, old and new approaches reveal the need for a classification system and even typology, with distinctive nomenclature, to use as a tool and not just as a label.

CONCLUSIONS: THE NEED FOR A DATABASE AND A RESEARCH NETWORK

Perhaps future sword conferences can be used as a platform to connect people who will create a new, holistic sword classification system. It is time to stop idolising previous classification systems and take steps outside a stagnated research environment by building on them and moving away in order to cover the needs of modern scholarship. Expanding or simply adopting old classification systems does not solve the problems presented here; a new organic ongoing database, however, could perhaps deal with them once and for all. Of course, this sounds idealistic and would require personnel and resources, as well as access to collections. Such a project could incorporate older classification systems and allow cross-examination, but most importantly allow instantaneous editing to include the latest research.

In conclusion, as the title of this paper is a quote taken from John Milius' *Conan the Barbarian* (1982), it would only be fitting to finish this article with a different one as well: "What is steel compared to the hand that wields it?" Perhaps research on medieval swords, and especially late medieval swords, has been partially stagnant for years compared to other research areas, but recent approaches have reignited interest for the subject, and have moved

¹³ Aleksić, *Medieval Swords from Southeastern Europe*.

¹⁴ Johnsson, 'Geometry and the Medieval Sword'.

¹⁵ Johnsson, 'The Sword in Motion'.

to new multi-layered, interdisciplinary methodologies that examine the form of the weapon in conjunction with its use. The people behind the conference that generated this volume are perfect examples of researchers with vision and determination that have rekindled the interest for fresh approaches to the sword. Not only have they organised a unique, organic exhibition, but also brought together people of different disciplines to discuss new ideas. Regardless of the various interesting subjects discussed at the event, one thing became clear; that besides discussion on the technical characteristics of swords, there is growing interest and high-quality research being conducted on the use of swords on a functional level within the object's context. Now the hand behind the weapon, the fighter, and the way the weapon is used are gradually receiving the deserved attention in research, providing a better understanding of the sword.

Challenging Typologies

Swords in the Utrecht Psalter

Stefan Mäder

THE CLASSIFICATIONS OF MEDIEVAL swords are largely based on the morphology of hilt components. Among these, the pommel is considered the part most susceptible to changes in “fashion”, and thus crucial for proving their dating. A pictorial source, the relevance of which for studies in early medieval arms and armour might have been overlooked, is MS 32 (Utrecht Psalter, c.820–35) in the Utrecht University Library. Provided that the Utrecht Psalter has been dated accurately, a re-evaluation of the chronological aspects of medieval sword pommel typo-chronologies appears inevitable. This is illustrated by the occurrence of the so-called brazil-nut, mushroom/tea-cosy, wheel/spherical, and two crescent-shaped pommels, which are clearly depicted among more readily accepted early medieval pommel types in the manuscript. Swords in the Utrecht Psalter thus do not only represent a contemporaneity between apparent “pre-Christian” and “Christian design” but must also be viewed in the wider context of the Carolingian Renaissance and some of its most significant roots in Anglo-Saxon England.

To establish a typology is a challenge in itself, but it is inevitable that scientific progress will constantly challenge even the most venerable typologies in archaeology. The cornerstones for typological and chronological categorisations of medieval swords have been laid by authorities like L’Orange, Petersen, Wheeler, Behmer, Bruhn Hoffmeyer, Oakeshott, Menghin, and Geibig.¹ A visual summary of existing typologies, including their chronological attributions, was published by Jones.² Problems related to the typological, geographical, and especially chronological attributions of medieval swords have been outlined by the aforementioned scholars, among others. Important factors necessary for obtaining a better understanding of the most prestigious weapon of the Middle Ages are analyses of its construction, production stages, use, and cultural significance; the last of these obviously encompasses a religious or

¹ Behmer, *Zweischneidiges Schwert*; Bruhn-Hoffmeyer, *Tveaeggede Svaerd*; Geibig, *Morphologische Entwicklung*; L’Orange, *Jernalders Sværd*; Menghin, *Das Schwert*; Oakeshott, ‘Sword Pommels’; *Records of the Medieval Sword*; Peirce, *Swords of the Viking Age*; Petersen, *De Norske Vikingesverd*; Wheeler, *London and the Vikings*.

² Jones, ‘Hilt and Blade’, pp. 18–19.

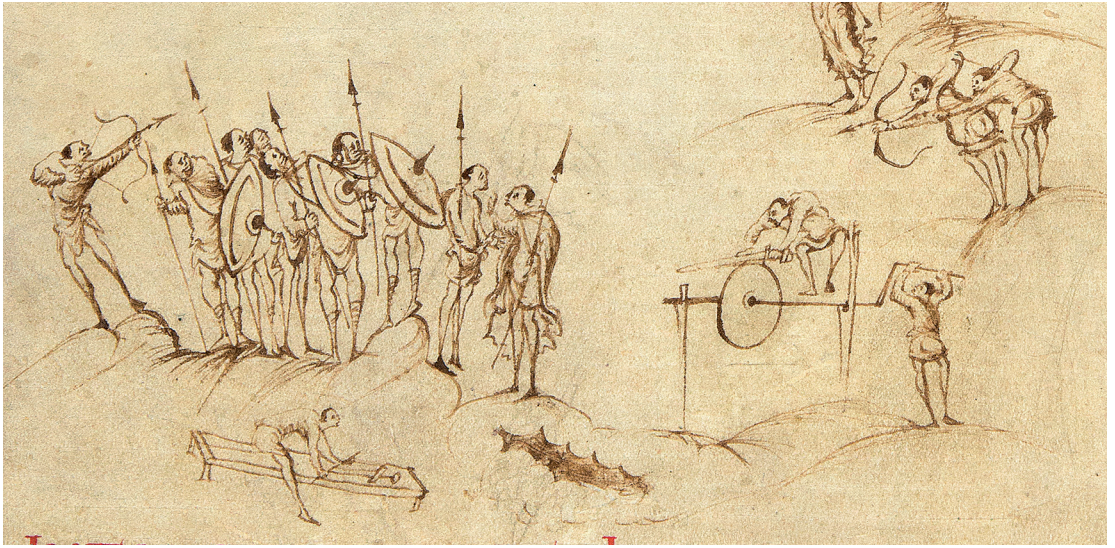


FIG. 1: Utrecht University Library, Ms. 32, fol. 35v.

spiritual component, but this has been mostly overlooked in mainstream studies which are archaeologically or technically orientated.³

In 1908 the Swiss scholar E. A. Gessler chose to dismiss the relevance of the swords illustrated in the *Utrecht Psalter* as follows: “no matter how important the *Utrecht Psalter* from the end of the ninth century may be for the lance, the swords are vaguely drawn”.⁴ His exemplary approach, however, which incorporated archaeological finds alongside pictorial and written evidence as part of a study of Carolingian arms has lost none of its importance.

The relevance of the evidence from the *Utrecht Psalter* may prove fruitful on several planes: the resulting chronological implications imply an earlier date for the emergence, and thus significantly wider timespans, for at least two types of “knightly” hilts which are considered part of current typologies. They may also serve to unravel some misconceptions concerning the long timespan assigned to the production of the famous “VLFBERHT” blades. The unique feature of the representations of sword hilts in the *Utrecht Psalter* is that they can be divided into two main categories; one consisting of pommels of apparent two-piece construction which fit well into established chronologies, and the other consisting of solid specimens that have hitherto been ascribed dates of at least 150–250 years after the production of the manuscript. The illustrations show an admirable sense of perspective. As some of the images are very vague, only the distinctly drawn swords are included here: the remainder form the category “indistinct pommel shapes/swords”. Owing to spatial limitations only representative illustrations can be rendered in this article. Still, the folio

³ Johnsson, ‘Righteousness’; ‘One Single Wholeness’; ‘Geometry and the Medieval Sword’; Mäder, *Stähle, Steine und Schlangen*, pp. 25–60; *Beseelte Klingen*, pp. 6–53.

⁴ Gessler, *Trutzwaffen der Karolingerzeit*, p. 118.

numbers given enable the reader to scrutinise the corresponding pages of the digital edition for themselves.

The impetus for the present study came in 1999 from the notion that the craftsman on the lower left on fol. 35v is polishing (not sharpening or even filing) a sword with a brazil-nut pommel (figs 1 and 3c). At first this was critically ascribed to the carelessness of the artist. Some years later, however, the opportunity arose to have a closer look at the facsimile, allowing for a significantly wider basis to re-evaluate some typo-chronological axioms in sword research. Adhering to the motto of the conference and its desire for archaeological perspectives, let us proceed from a relatively safe assessment of form to the dangers and delights of thought.

FORM

Pommels and crosses fitting established chronologies

There are fourteen arguable instances for pommels of a distinct two-piece construction.⁵ Nine specimens largely correspond to Petersen's type N⁶ and Geibig's combination types 5 and 8.⁷ In the case of the hilts depicted in the *Utrecht Psalter*, however, the upper guards mostly project beyond the width of the pommel, which is also a feature of Petersen's type F. It is worth mentioning that his dates for types N and F fall into the first half of the ninth century, when the *Utrecht Psalter* was produced.

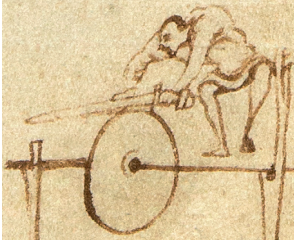
The hilt of a sword, which is in the process of being ground by a craftsman on the right-hand side of fol. 35v, clearly shows the division between upper guard and pommel (fig. 2a). The inclusion of this type calls to mind Petersen's type N, and also oscillates between Geibig's combination types 5 and 8. Two other examples are extant on fol. 91v (fig. 2b). In the centre of fol. 13v a warrior is holding a sword whose pommel shows the outline of a curved crown. Other examples of this pommel type can be seen on fol. 21r, fol. 25r (centre below), fol. 48v, fol. 73v, and fol. 85r (Petersen type N or X). Petersen's type N, respectively Geibig's combination types 5 and 8, is attributed to a period between c.800 and the second half of the tenth century. A projecting upper guard is a feature of Petersen's three- to five-lobed types – O, R, S and T – which are all also commonly dated between c.900 and 1000.

In fol. 74r God is depicted handing over a sword with a hilt of Petersen's type H or I (fig. 2c). Other examples of this type of hilt are depicted on fol. 21r (above a type N hilt) and fol. 26r. Petersen's type H (of which type I is viewed as an offspring from the second half of the ninth century) evolves from the last quarter of the eighth century onward and can be traced until the latter half of the tenth century. Fol. 72v clearly shows a three-lobed pommel, which frequently appears in the illustrations of a manuscript produced in around 820/30 at the

⁵ Fol. 13v, type N: 1, fol. 21r, type I: 1, type N: 1, fol. 25r, type N: 1, fol. 26r, type I: 1, fol. 35v, type N: 1, fol. 48v, type N: 1, fol. 72v, type K: 1 (three-lobed pommel), fol. 73v, type N: 1, fol. 74r, type H/I: 1, fol. 85r, type N/X: 1, fol. 85v, type M: 1, fol. 91v, type N: 2. Overall number: 14.

⁶ Petersen, *De Norske Vikingsverd*, pp. 125f, fig. 103.

⁷ Geibig, *Morphologische Entwicklung*, pp. 38–44, 48–50.



(Clockwise, from left) Fig.
2a: Utrecht University
Library,
Ms. 32, fol. 35v;
b: *ibid.*, fol. 91v;
c: *ibid.*, fol. 74r.



abbey of Saint-Germain-des-Prés near Paris, the so-called *Stuttgart Psalter*.⁸ This type of pommel is not very common throughout the archaeological record.⁹ There is a single instance for a type M or F hilt on fol. 85v, which corresponds to the creation date of the *Utrecht Psalter*. It should be noted that none of these pommels have an upper guard with a convex baseline.

Pommels and crosses not fitting established chronologies

Brazil-nut pommels

Fifteen swords with so-called “brazil-nut” pommels (Oakeshott type A,¹⁰ Geibig combination type 16, Var. 1¹¹) could be identified.¹² The most obvious examples are visible in folios 7v, 8v and 35v (fig. 3a–c), where the size ratio between the pommel and cross, as well as the ratio between cross and blade width, are of interest.

While the swords of the figures displaying severed heads in fol. 7v have cross-guards that “fit” the typologies of Carolingian/early Viking Age swords, the sword in the seated figure’s lap, and the left one in fol. 35v, both show a longer type of cross-guard that would be expected not to appear until at least a century later. The cross-guard of the angel’s sword in fol. 8v is again on the shorter side. The chronological significance of these observations however, lies not in the length of the crosses, but in the shape of the pommels. Here and in ten other cases we face a pommel outline whose emergence has been dated between the twelfth and the thirteenth century by



⁸ *Stuttgarter Psalter*.

⁹ Petersen, *De Norske Vikingesverd*, p. 96, fig. 84.

¹⁰ Oakeshott, *Sword in the Age of Chivalry*, pp. 80–93; *Records of the Medieval Sword*, p. 10.

¹¹ Geibig, *Morphologische Entwicklung*, pp. 70–73.

¹² Fol. 7v: 2, fol. 8v: 1, fol. 30r: 1, fol. 30v: 1, fol. 32r: 1, fol. 33r: 1 (with single-edged blade?), fol. 34r: 1, fol. 34v: 3, fol. 35v: 1, fol. 42r: 2, fol. 57v: 1. Overall number: 15.



(From the top)
 Fig. 3a: Utrecht University
 Library, Ms. 32, fol. 7v;
 b: *ibid.*, fol. 8v;
 c: *ibid.*, fol. 35v.

several authorities. In 1977 Gamber still maintained a starting date of around 1200 for the brazil-nut pommel: “with respect to German swords the ‘brazil-nut’ pommel introduced itself for the whole of the thirteenth century, concerning Western European ones this holds true for the wheel-pommel”.¹³ Oakeshott was on the right track in 1951 when he commented on the development of the brazil-nut and the mushroom shape of sword-pommels: both forms developed simultaneously in the early to mid-tenth century, if not before. The different varieties of the brazil-nut pommel, with a greater or lesser degree of curvature to their bases, were in use at the same time, alongside the more familiar lobed types of Viking pommel: the variations in its shape were probably the result of chance, or personal taste, and not a matter of date at all.¹⁴

Further research is required on chronological undercurrents of the brazil-nut pommel: it is a task impossible to tackle in the present preliminary study. It is sufficient to note, however, that at present, the earliest pictorial evidence for the existence of the brazil-nut pommel is contained in the *Utrecht Psalter*.

Tea-cosy pommels

There are six illustrations for what, in the meantime, are commonly referred to as tea-cosy pommels in the *Utrecht Psalter* (fig. 4).¹⁵ This pommel shape was long thought to have emerged at least a few decades after the completion of the *Utrecht Psalter*. It is the determining feature

¹³ Gamber, ‘Bewaffnung der Stauferzeit’, p. 116.

¹⁴ Oakeshott, ‘Sword Pommels’, p. 51; *Sword in the Age of Chivalry*, pp. 80–93.

¹⁵ Fol. 19r: type X: 1, fol. 34r, type N or X: 1, fol. 80r: 1, fol. 83r: 3. Overall number: 6.

of Petersen's types N, V, W, and X.¹⁶ A fine distinction between these types is, however, impossible when evaluating their representations in the *Utrecht Psalter*: one is faced with several difficulties in matters such as determining the material of the pommel or details of symbolic decoration. It was Oakeshott who first likened this group of pommels to the shape of tea cosies and put forth a date based on archaeological evidence in 1951.

The earliest datable swords with tea-cosy pommels were found in the Seine below Paris where there was much fighting during the famous siege in 885–86, while the earliest brazil-nut pommels have been found in Norwegian graves of about 950.¹⁷ Geibig managed to push back the date for some examples of the tea-cosy group even further. He divided individual swords of this general outline into his combination types 8, 11, and 12.¹⁸

The emergence of combination type 8 is dated to around c.830, which corresponds to the date ascribed to the completion of the *Utrecht Psalter*. This is mentioned here because several of Geibig's substantial findings are still generally ignored by archaeologists, and particularly by exponents of sword research. Type 11 is attributed a timespan from c.900 to 950 and type 12 Var. I from c.850 to 1000. The dates proposed by Petersen, Oakeshott and Geibig for the emergence of pommels with a rounded to semi-circular crown-line come close to the completion date of the *Utrecht Psalter*. Considering the timespan between a morphological novelty and its first representation in art, the evidence from the *Utrecht Psalter* suggests a date of around 800 for the emergence of more massive pommels with a rounded or lobed crown-line. Their more delicate precursors range in date from the fifth to the eighth century.¹⁹

Wheel/spherical pommels

Five swords with pommels of an apparently circular outline are represented (fig. 5).²⁰ These are commonly considered typical for "knightly" swords from the eleventh to the sixteenth centuries. In Jones'²¹ illustration of typo-chronologies a pommel-type with a circular outline is attributed a starting date of c.1050. This date is corroborated, by the examples from the



FIG. 4: Utrecht University Library, Ms. 32, fol. 80r.

¹⁶ Petersen, *De Norske Vikingesverd*, pp. 125, 154–64, p. 126, fig. 103.

¹⁷ Oakeshott, 'Sword Pommels', p. 52.

¹⁸ Geibig, *Morphologische Entwicklung*, pp. 48–50, 54–60.

¹⁹ Menghin, *Das Schwert*, pp. 135–37.

²⁰ Fol. 30v: 3, fol. 51v: 2. Overall number: 5.

²¹ Jones, 'Hilt and Blade', pp. 18–19.



FIG. 5: Utrecht University Library, Ms. 32, fol. 30v.

Bayeux Tapestry embroidered around 1070, among other instances.²² It cannot, of course, be inferred from such two-dimensional images whether or not the prototypes for these round pommels were of a flattened “wheel” shape or of a spherical one. In any case, round pommels depicted in the *Utrecht Psalter* appear to be approximately 200 years too early.

Crescent-shaped pommels

The most curious pommels drawn in the Psalter are those on folio 49r (fig. 6a–b).²³ The specimen on the left looks like an inverted type X or rather like Geibig’s combination type 16 Var. I.²⁴ The one on the right appears to be of a two-piece construction, consisting of a crescent-shaped upper guard and a rounded pommel, resembling Petersen’s type L, respectively oscillating between Geibig’s combination types 7 and 13 Var. II. From a conservative viewpoint, it may be tempting to ascribe these two pommels to a carelessness of the artist, were it not for the existence of equally typo-chronologically unsettling crescent-shaped pommels – which belong to Geibig’s combination type 13 – on three swords illustrated by A. Williams with “VLFBERHT” blades.²⁵ These hints may prove useful when confronted with the task of ascribing a date range for a Carolingian blade joined to a seemingly later hilt.

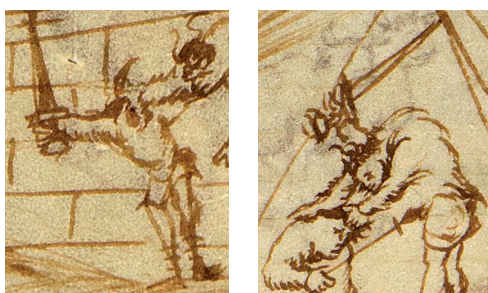


FIG. 6: Utrecht University Library, Ms. 32, fol. 49r, a, b.

²² Mann, ‘Arms and Armour’, pp. 65–66.

²³ Fol. 49r: 2. Overall number: 2.

²⁴ Geibig, *Morphologische Entwicklung*, pp. 70–73.

²⁵ Williams, ‘Metallurgical Study’, p. 146, figs 1–2, p. 155, fig. 35, p. 160, fig. 49.

Indistinct pommel shapes/swords

There is not much to be said about these, except that one or other may in the future be ascribed to one of the former categories by colleagues with better eyes than the present author, or with access to the original manuscript.²⁶

THOUGHT(S)

As outlined above, two distinct groups of pommel representation can be detected in the *Utrecht Psalter*. One corresponds to the dating ascribed to the manuscript (c.820–35), and the other consists of pommel shapes both slightly and thoroughly out of place (and time) from an archaeological perspective. Has the *Utrecht Psalter* been dated too early or are we confronted here with a unique case of Carolingian science-fiction? The more rational question to be raised is rather, why should there have been a significant change in sword design around or shortly after the year 800?

Provided that the *Utrecht Psalter* has been dated correctly, and that the seemingly later swords depicted therein are based on tangible models existing at the same time, an attempt at a multi-layered explanation may prove fruitful. Changes in military tactics with an emphasis on mounted warfare under Charlemagne concur with adaptations to foot combat in the sphere under Frankish control.²⁷ These changes also had effects on the outline of a sword's cutting edges, which Coupland summed up as follows:

The reign of Charlemagne also witnessed a significant change in the shape of the longsword blade. On earlier swords, the edges had run parallel for most of the length of the blade, then converged sharply a little way above the point. After about 800, however, the edges of the blade tapered gradually from hilt to tip, with the result that the centre of gravity shifted toward the sword grip, making the weapon significantly more manoeuvrable and facilitating swordplay.²⁸

Several developments in sword design during the eighth and ninth centuries occurred alongside technological advancements in steel manufacturing, and in all likelihood have precursors in Anglo-Saxon England.²⁹ Recently, the use of Carolingian domed round-shields and flat round-shields in combination with the sword was examined by R. Warzecha from a perspective of practical swordsmanship.³⁰ His preliminary findings imply that some of the changes in sword design were, to a significant degree, due to the method involved in using

²⁶ Fol. 2r: 1, fol. 4r: 1, fol. 5r (type M?): 1, fol. 7v: 2, fol. 11r (with downward-curved cross): 1, fol. 19r: 1, fol. 26v: 2, fol. 34v: 1, fol. 42r: 1, fol. 57v: 1, fol. 67r: 1, fol. 71v: 1, fol. 76v: 1, fol. 78v: 1, fol. 86r: 1. Overall number: 17.

²⁷ Steuer, 'Bewaffnung und Kriegsführung'; Bachrach, *Early Carolingian Warfare*; Hampton, 'Viking Age Arms and Armour'.

²⁸ Coupland, 'Carolingian Arms', pp. 148–60.

²⁹ Petri, 'Europäische Schwertformen', pp. 132f.

³⁰ Warzecha, 'Form folgt Funktion'.

domed round-shields as opposed to the preceding flat round-shields. This kind of shield is represented extensively in the *Utrecht Psalter* as well as in the *Stuttgart Psalter*.

Throughout the last hundred years such an amount of tangible evidence for the symbolism of weaponry from different archaeological periods has come to light that it appears justifiable to gradually proceed from formal categorisation and positivistic truisms to interdisciplinary/intercultural evaluation and attempts at interpretation, thus moving from form to thought. The disturbing swords in the *Utrecht Psalter*, in my opinion, reflect Charlemagne's well-attested need for a Christian/spiritual foundation for warfare, and the exertion of power by means of the sword as its most prominent biblical symbol. It is not surprising that this need had a profound influence on the emergence of what could be termed "Christian weapon design". The manifold references to the sword in medieval religious literature are indisputable.³¹ In fact the sword evidence from the *Utrecht Psalter*, and a yet incalculable number of misdated Carolingian swords, are tangible evidence for an attempt to realise the existence of a *miles christianus* well before the emergence of the "medieval knight". This conclusion has already been hinted at from historical perspectives, such as under the heading "Spiritual Help" in B. S. Bachrach's study on early Carolingian warfare.³²

Returning to pommel shapes, from an archaeological viewpoint there is a basic hindrance for dating the origins of pommel shapes which are generally assigned to the age of chivalry. This holds true not only for the tea-cosy, the brazil-nut and the wheel types. In continental Europe, the furnishing of the deceased with grave goods ceased during the eighth century, in unison with the spread of Christianity, but persisted in Scandinavia and eastern Europe.³³ The main body of surviving swords assigned dated between the ninth and fifteenth centuries in central and western Europe have been recovered from rivers and lakes, their attributive dates reflecting neither more nor less than the respective state of typo-chronological research.

Until now all archaeological evidence points to the origin of the brazil-nut pommel on British soil, where Anglo-Saxon sword pommels of two-piece construction display a convex base-line from at least the first half of the ninth century. Pioneering, interdisciplinary research on Anglo-Saxon swords has been published by H. E. Davidson.³⁴ A nearly comprehensive overview illustrating swords of this type from Britain has been published online by G. and L. Archer.³⁵ Their characteristic hilts were categorised by Petersen as his type L,³⁶ by Wheeler as type V,³⁷ and by Geibig as combination type 7.³⁸ A chronological outlier of more dainty proportions, K 1167 (resp. StH 1167), possessing a convex base-line, is one of the approximately eighty-six sword pommels from the Staffordshire hoard discovered in 2009,

³¹ With respect to Charlemagne in particular: Röckelein, *Schwert als Zeichen von Macht und Herrschaft*, pp. 48–52.

³² Bachrach, *Early Carolingian Warfare*, pp. 147–59.

³³ Härke, 'Beigabensitte und Erinnerung', pp. 108–10.

³⁴ Davidson, *The Sword in Anglo-Saxon England*.

³⁵ Archer and Archer, 'Swords Found in Britain', pp. 34–51.

³⁶ Petersen, *De Norske Vikingesverd*, pp. 112–16.

³⁷ Wheeler, *London and the Vikings*, pp. 35, 32, fig. 13.

³⁸ Geibig, *Morphologische Entwicklung*, pp. 47f.



FIG. 7: Pommel K 1167 from the Staffordshire Hoard, c. 650–700 A.D.

which is tentatively dated between 650 and 700 (fig. 7).³⁹ Concerning the pommel and guard types of Anglo-Saxon swords of the ninth century, P. Bone stated in 1989 that “even more striking is an entirely new development – the upper and lower guards are curved away from the grip, rather than straight. This seems to have been a particularly English development that later spread to Scandinavia”.⁴⁰

An example of a traded or well-travelled Anglo-Saxon hilt with curved guard and pommel came to light at a grave in Bolsæter, Jølster, Norway. It was found together with an axe and lance of types dated to the first half of the ninth century. Eventually this chronological mismatch led Petersen to the naming of the subtype 7 of his type G for the sword, and not to an inclusion into his type L.⁴¹ Another sword with the same typological characteristic from Farmen, Hedrum, is listed as subtype 14 of type M by Petersen, and dated to the middle of the ninth century.⁴² A further type M subtype is a sword from Vesteren, Lunner, the pommel and cross of which are also curving away from the hilt.⁴³ One of the most splendid Anglo-Saxon swords is a river-find from the Netherlands.⁴⁴ As these swords in all probability originated in England, their date of manufacture can be pushed back well into the first half of the ninth century or even further to around 800. As indicated by the outcome of iconographical studies in arms and armour, a few years to decades elapsed between the emergence of a new feature in weapon design and its rendering in medieval art. Thus, a date of around the year 800 for the emergence of the brazil-nut pommel can be inferred from the evidence extant in the *Utrecht Psalter*.

Due to the assumption that different types should belong to different fractions of time, the wheel-pommel is still often considered a phenomenon ranging in time from the eleventh to the sixteenth century. Accordingly, swords with wheel pommels and blades containing iron inlays typical for Carolingian blades are viewed as “marriages” between an earlier blade

³⁹ Fischer and Soulat, *The Typochronology of Sword Pommels*, fig. 9, no. 1167.

⁴⁰ Bone, ‘Development of Anglo-Saxon Swords’, p. 66.

⁴¹ Petersen, *De Norske Vikingesverd*, p. 89, fig. 77.

⁴² *Ibid.*, p. 122f, fig. 101.

⁴³ *Ibid.*, p. 123f, fig. 102.

⁴⁴ Ypey and Willems, ‘Ein angelsächsisches Schwert’.

and a later hilt. The same holds true for Carolingian blades mounted with brazil-nut, tea-cosy, or cocked-hat pommels, which has led several researchers to advocate a lifespan of c.250 years (from c.800 to c.1050) for the production and application of allegedly original or copied “VLFBERHT” swords.⁴⁵ The possibility of wheel, tea-cosy, and brazil-nut pommels dating back to around 800 has not yet been explored. As indicated by their variety, the pommels in the *Utrecht Psalter* are not drawn haphazardly. Thus, the occurrence of specimens with a rounded outline also renders necessary a re-evaluation of swords with “VLFBERHT”, “INGELRII”, related iron inscriptions, or geometrical inlays, particularly if they possess the aforementioned pommels. An interesting example for this notion was published in 1964 by J. Leppäaho.⁴⁶ Moreover, the possibility that the origins of the “IN NOMINE DOMINI” group of inlays (if executed in iron) may ultimately date back to around 800 is by no means fallacious. This is hinted at by a sword from Espenhain (Borna county, Saxony) featuring both an “VLFBERHT” and an “INIOMINEDMN” inscription.⁴⁷ Acknowledging the evidence for “later” pommels in the *Utrecht Psalter* requires a distinction between largely contemporary swords mounted in a Frankish/Christian fashion and those mounted in a Viking/pre-Christian fashion. This distinction in turn means that the hitherto presumed lifespan for the existence of an “VLFBERHT” workshop encompassing eight to ten generations is by far too long. If the “late” sword hilts in the *Utrecht Psalter* are neither fancy nor fantasy, a significantly shorter timespan for the production of alleged original and/or copied “VLFBERHT” blades appears more reasonable.

Except for an innovative geometrical approach pursued by P. Johnsson⁴⁸ there has been hardly any research done in respect to the symbolic meanings of hilt and pommel shapes. In a 2007 online publication the author of the present paper proposed a tentative interpretation of some medieval pommel shapes as representing different phases of the moon.⁴⁹ The brazil-nut pommel was, on the one hand, linked to the outline of the moon’s appearance immediately preceding and following what is called in astronomical terms the first and the third quarter. On the other hand, it could be connected with the outline of the shadow during a partial lunar eclipse. Tea-cosy pommels were associated with the first and third quarter in the lunar cycle (half-circle = half-moon). Wheel pommels were linked to the full moon and crescent-shaped ones to the crescent and its waning equivalent. It was acknowledged at that time that the main argument against this interpretation was the supposed chronological sequence from tea-cosy over brazil-nut and wheel pommels towards the supposedly latest crescent-shaped pommels. However, as shown above, these pommel-shapes are present contemporaneously in the *Utrecht Psalter*.

From a historical point of view the revival of classical astronomical knowledge is one of the major parts of what is termed the Carolingian Renaissance. But why should there

⁴⁵ Stalsberg, *Vlfberht Sword Blades*, pp. 7–10; ‘Herstellung und Verbreitung’; Williams, ‘Metallurgical Study’, p. 124; Grotkamp-Schepers et al., *Das Schwert*, p. 55.

⁴⁶ Leppäaho, *Späteisenzeitliche Waffen*, pp. 28f.

⁴⁷ Geibig, *Morphologische Entwicklung*, p. 120.

⁴⁸ Johnsson, ‘Righteousness’; ‘One Single Wholeness’; ‘Geometry’.

⁴⁹ Mäder, ‘Pilze, Paranüsse, Teewärmer’.

be a connection to England concerning the introduction of the brazil-nut pommel? An answer lies in the fact that the most influential advisor to Charlemagne was Alcuin of York (735–804). Under his auspices several aspects of the Carolingian reforms were carried out, including intensified efforts for reliably determining the date of Easter (computistics). To this end exact observations of the moon's phases were indispensable and became a vital part of Carolingian astronomy and cosmology.⁵⁰ It can safely be assumed that Alcuin had a solid astronomical background and would have read Bede's (c.672–735) astronomical/calendrical work *De Temporibus*. The subsequent compilation of the Anglo-Saxon Chronicle in the ninth century also refers to earlier astronomical observations which were probably known to a scholar of Alcuin's calibre.⁵¹ The incorporation of the latest technical and cosmological findings into weapon design under Charlemagne may not make sense from a seemingly rational perspective of present-day archaeology, but from the viewpoint of ecclesiastical history and military psychology it certainly does. Astral symbolism occurs on weaponry from all epochs starting in the later Palaeolithic and, with a few gaps, coming to an end as recently as the nineteenth century. Indeed, here one can see how "form follows function" in respect to sword design and decoration. That this holds true not only in a practical, but also in a religious or spiritual sense, will be further elaborated and illustrated elsewhere.

CONCLUSION

All in all, fifty-nine representations of swords from the *Utrecht Psalter* were considered. Apart from the specimens included in this paper, a few cases of "sword-like objects" were also identified, which may in the future turn out to be swords. If this were to be the case, they would have to be assigned to the category of indistinct examples. The pictorial, historical, and use-related evidence considered throughout this article suggests that some of the practical pommel and cross shapes of the so-called knightly sword, which were not just decorative, were already in use around the turn of the ninth century, thus emerging earlier than the tenth or eleventh, as it has been traditionally thought. When accepting a date-range of c.820–35 for the Utrecht Psalter, it becomes apparent that many medieval swords from undated contexts such as rivers, lakes, and single finds, have been mis-dated by 200–400 years. The contemporaneity of Carolingian swords with hilts in a "pre-Christian" tradition on one hand, and "Christian" hilts on the other, is thus clearly attested by pictorial evidence from the Utrecht Psalter. Consequently, the dating of brazil-nut, tea-cosy, wheel, and crescent pommels featuring on swords with blades of Oakeshott's type X, Geibig's types 2 and 3 and those with iron inlays (VLFBERHT group, INGELRII group, and other inscriptions like the "IN NOMINE DOMINI" group as well as cosmological symbols) requires thorough revision. This is how the Utrecht Psalter is challenging typologies.

⁵⁰ Springsfeld, *Alkuins Einfluss auf die Komputistik*.

⁵¹ Härke, 'Astronomical and Atmospheric Observations'.

“... schirmen mit Federklingen”

Towards a Terminology of Fencing Swords (1400–1600)

Daniel Jaquet

LATE MEDIEVAL AND EARLY modern fencing swords (Fechtschwerter) form a (sub)type of two-handed swords which have received little scholarly attention. Their specificities and use are connected to competitive fencing practices in an urban context, as documented by the fight books and related sources. This contribution proposes a review of their denomination, based on the secondary literature regarding the few known specimens in collections of arms and armour, presented alongside terminological research based on historical documents. Secondly, based on a parallel study of three representative specimens kept in Zürich, it offers an identification, a description and an analysis of their main characteristics: the schilt (ricasso), and the flared blade of a rectangular cross section leading to a flattened tip larger than the blade. Lastly, it opens up new avenues for research on both the few identified specimens and the representation of the (sub) type, mainly within the corpus of fight books from the same period.

During a fencing competition organised in Strasburg in c.1470, the fencers were instructed to leave their own (sharp) weapons outside of the fencing ground and to fight with (blunted) swords provided by the organisers, paid for by the town.¹ Following Dupuis’ interpretation of this source, we can assume that this safety precaution was intended to prevent fatal injuries in the context of fencing competitions known as “fencing schools”.² These competitive events, intended for burghers and commoners fighting without armour or protective gear (*bloß*), can be traced in an urban context from at least the middle of the fifteenth century in the Holy Roman Empire, the old Swiss Confederation, the Low Countries and the north of the Italian Peninsula. These are connected to fencing guilds (or brotherhoods), which received authorities’

¹ “Item das ouch alle meisterer und schüler so jn den schrancken kommen vechten halp alle jr gelbere von jren tûn vnd ußwendig des schrancken zû lassen.” Quoted after Dupuis, ‘Fifteenth-Century Fencing Tournament’, p. 77, and discussion of this passage and others in relation to weapons on p. 72.

² On fencing schools, see Schaufelberger, *Wettkampf in der alten Eidgenossenschaft*; Tlustý, *Martial Ethic*; ‘Martial Identity’; Gevaert and van Noort, ‘Martial Tradition in the Low Countries’; Jaquet, ‘Fighting in the Fightschools’; ‘Die Kunst des Fechtens in den Fechtschulen’; Jaser, ‘Ernst und Schimpf’.

recognition and privileges as early as 1456³ for the Low Countries and 1487⁴ for the Holy Roman Empire. The golden age of these competitive practices, however, spans from the second half of the sixteenth century to the early seventeenth century.⁵ During these “sportive” events, the longsword remained the queen of weapons, even if other types were also used and, at that time, the symbolic two-handed late medieval sword had fallen out of favour on the battlefield.

What exactly were those weapons used in the fencing school of Strasburg and in many other similar venues? We can gather a relatively large iconographical corpus from various source types, compared alongside written sources about either the art of fencing or the competition itself. There are, however, very few corresponding realia kept in arms and armour collections today, at least as far as research to date can highlight.

All the swords listed in table 1 bear the same features: a handle long enough to allow a grip of three to four hands, terminated by a pommel of round form; a straight cross-guard, rounded or blunted at the extremities; a straight or trapezoidal *schilt* (or *ricasso*,⁶ a metal appendage raising from the cross-guard which is wider than the blade); a blade of a rectangular cross section with no sharp edges, with a length of 98–120cm, usually flared towards a flattened point of rounded shape larger than the basis of the rest of the blade after the *schilt*.

This article will offer a state of research by reviewing the historiography, where this (sub) type of weapon was neglected by authoritative arms and armour scholars and never properly included in any known typology.⁷ The terms given by institutions to the known specimens and their denomination in secondary literature will be discussed in order to propose a compromise for the use of a proper *terminus technicus*, contrasted against its mentions in primary sources. Finally, the main features of these extant swords, based on a parallel case study, will be put in perspective with their representations in fight books.

FEDER, FEDERSCHWERT. THE SWORD AND THE QUILL: THE ORIGIN OF THE CONFUSION

Late nineteenth-century arms and armour collectors, fencing historians, and fencing enthusiasts have left traces of their earlier attempts to revive late medieval and early modern

³ Galas, ‘Statutes of the Fencing Masters’; Gevaert and van Noort, ‘Martial Tradition in the Low Countries.’

⁴ Wassmannsdorff, ‘Kaiser Friedrich’s III. Privilegiumsbrief’; Huhle and Brunck, *500 Jahre Fechtmeister in Deutschland*.

⁵ Wassmannsdorff, *Sechs Fechtschulen*.

⁶ This term is not correct since it is imported from other terminologies; the historical Early New High German term *schilt* (shield) is more appropriate. For a definition of *ricasso* (*Fehlschärfe*), see Seifert, ‘Fachwörter der Blankwaffenkunde’.

⁷ Except maybe in the contribution of Tilman Wanke offering a categorisation of swords of the period. Wanke, ‘Anderthalbhänder – Zweihänder – Langes Schwert’. See discussion below (2 and 3).

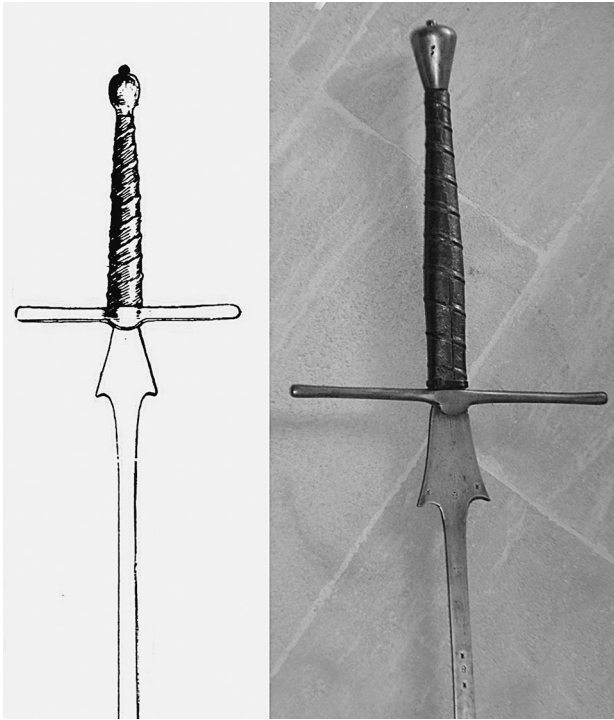


FIG. 1a (left): Fencing sword sketched by Hutton; b (right): Fencing sword kept in Arundel castle (Inventory no.: ID.3302, Arundel Castle Collection).

fencing practices.⁸ Some of them described the training weapon used to fence according to the ancient art of fighting with the two-handed sword (or longsword). Among those, Alfred Hutton even included a drawing of the “foil sword of steel, that were also used for the instruction and the practice of the two-hander”,⁹ which he acquired from the collection of the Baron Cosson (see fig. 1). This very sword used by the author in many exhibition bouts in late nineteenth-century London, is likely to be the one – or similar to the one – kept today in Arundel Castle.

Schmied-Kowarzik and Kufahl, two fencers who have turned their attention to the history of fencing in the late nineteenth century,¹⁰ described these training weapons as follows:

The two-handed sword, which was used on the fencing ground and during the ‘fencing schools,’ was approximately so long that the pommel, when the tip rests on the ground, reached the middle

⁸ For a good example, see Wolf, *Ancient Swordplay*, which offers a review of those activities in London between 1880 and 1920. There are many other examples in Belgium, France, Switzerland, Italy, and Germany, but these are little researched to date. The author is preparing an article proposing a short European history of these revivals, accompanied with biographies and research on the collectors of fight books.

⁹ Hutton, *The Sword and the Centuries*, p. 43. The sword is depicted on p. 43, with the caption: “Two-hand fencing sword in the possession of Captain A. Hutton, F.S.A.”

¹⁰ Josef Schmied-Kowarzik, Hans Kufahl and Prof. M. Werndnik were the founders of the fencing club *Haudegen* in Vienna, which pioneered in the reconstruction of ancient fencing praxes.

of the chest of a standard-sized man (120–130 centimetres). The handle was so long that it could be comfortably grasped by three hands one after another; the blade length comprised ca. three times the handle length and had a width of two fingers. At the hinge the blade widened, the tip was blunted and the cross-guard straight and approximately 25 centimetres long.¹¹

Their description of the shape of these swords and some of their features (like the blunted tip) is correct. They did not, however, “name” these swords by any neologism and failed, like all of their contemporaries,¹² to use historical terms to refer to it. The sport historian Karl Wassmannsdorff was a pioneer in the study of fight books and competitive fencing practice; in his 1870 book, featuring editions of sixteenth-century descriptions of fencing schools, he used the term “*Feder*” (feather or quill) to refer to these swords and the specific kind of fencing practice implied by their use (fencing schools), largely by metonymy in relation to a specific fencing guild: the Free Fencer of the Feder (*Freifechter von der Feder* or *Federfechter*), founded in Prague in 1570 with St. Vitus as its patron saint.¹³ His counterpart in the United Kingdom, the fencer and historian of fencing Egerton Castle, used the same term in his publication.¹⁴

This late nineteenth-century metonymy (“*Feder*” for the sword used by the *Federfechter*) can be traced to the second half of the sixteenth century, not only in documents related to fencing practices (descriptions of fencing schools, poems, and writings from the fencers themselves), but also in literary narratives where the metaphor of sword and quill is echoed. There, the image of the sword writing in blood like the quill with ink is often used, as in Johann Fischart’s German translation of the *Gargantua* of Rabelais or in some of the songs by the *Augsburger Meistersinger* Hans Sachs.¹⁵ This very image is at the centre of the rivalries

¹¹ Schmied-Kowarzik and Kufahl, *Fechtbüchlein*, p. 93: “Das zweihändige Schwert, dass aus dem Fechtboden und bei den ‘Fechtschulen’ gebraucht worden ist, war ungefähr so lang, dass der Knauf, wenn die Spitze auf der Erde stand, einem Manne mittlerer Grösse bis zur Mite der Brust reichte (120–130 Centimeter). Der Griff war so lang, dass drei Hände bequem nebeneinander zugreifen konnten, die Klingenlänge betrug etwas drei Griffängen und hatte eine Breite von zwei Fingern. An der Angel verbreiterte sich die Klinge, die Spitze war abgestumpft und die Parierstange gerade und ungefähr 25 Centimeter lang”.

¹² Several terms are to be found in the late nineteenth to the early twentieth century for referring to these weapons, most of them are chosen to describe either the handling (two-handed sword) or the context of application like “*Fechtwaffe*” (fencing weapon), used by Alfred Schaer (Schaer, *Die altdutschen Fechter*).

¹³ See Tlustý, ‘*Martial Identity*’, p. 555. For opposed views in the older historiography, see Schaer, *Die altdutschen Fechter*, pp. 54–59, criticising Wassmannsdorff, *Sechs Fechtschulen*, pp. 33–43.

¹⁴ Castle, *Schools and Masters of Fence*, pp. 30, 74.

¹⁵ “[...] die Franckfortische Meister deß Langen Schwerdts, schrieb mit Dinten so ficht wie Blut, die Feder muß ihm oben schweben, [...]” Fischart, *Geschichtklitterung*, p. 274b. Quoted in Schaer, *Die altdutschen Fechter*, p. 54. About Hans Sachs, see literature quoted in Jaquet, ‘*Fighting in the Fightschools*’. Both Fischart and Sachs were fencers themselves. Fischart (*Geschichtklitterung*, pp. 172b, 188a, and 253a) also uses the term “*federklingen*” (feather- or quill-blade), “*paratschwerd*” (parade or ceremonial sword), and “*fechtschwerd*” (fencing sword). Quoted in Schaer, *Die altdutschen Fechter*, pp. 54 and 128. For the difference between those swords, see below.

between concurrent fencing guilds in the second half of the sixteenth century, as pointed out by Wassmannsdorff and revised by Schaer.¹⁶

This is the origin of the neologism “*Federschwert*” (quill-sword or feather-sword) used by the late nineteenth-century historians. This misleading term appears now in both academic and more popular literature (see below), but is also widely used today by the communities of practitioners of Historical European Martial Arts.

MODERN DENOMINATIONS AND ANCIENT TERMS: WRESTLING WITH WORDS

In table 1 are listed the terms found in secondary literature or in institutional catalogues to denominate the known specimens. Such a variety of terms contributes to the difficulties present in establishing a proper research field or to simply refer to it in an academic publication. In addition, these terms are rarely documented or explained by the authors using them, echoing the same issue faced by late nineteenth- and early twentieth-century authors. It is also symptomatic of the neglect of these specific swords by authoritative arms and armour scholars in their sword typologies.¹⁷

A careful review of the fight books reveals that these weapons are simply referred to as “sword” or “longsword”, even if a significant number of the illustrated fight books display representations of fencing swords with their main features (see discussion below). The quest for historically specific terms must thus be pursued in other types of sources related to fencing (or fighting, *fechten*, *schirmen*) practices, for example in administrative sources such as the protocols of town councils, which recorded incidents happening in fencing schools, or authorities’ decisions regarding the organisation of these events. In most of the sources reviewed, the weapons are also referred to as “swords”. In one entry from the protocol of the Council of Zürich in 1521, however, a fencer is fined for causing an injury to another citizen. The term “*Fächtschwer[t]*” (fencing sword) is used to denominate the weapon used: “[...] Fabian, the apprentice of the gunner, and Geny Ringler, the champion of the fencing master, for having stricken each other with fencing swords to the bleeding wound (*Blütrunss*)”.¹⁸ There is no doubt left as to the context in which this incident happened – a fencing school

¹⁶ For example, both Wassmannsdorff (*Sechs Fechtschulen*, p. 13) and Schaer (*Die altdeutschen Fechter*, p. 57) commented on the verses on the printed invitation for the fencing school in margin of the shooting festival in Zwickau in 1574, where the following text highlights these rivalries: *Wer mir ein von der feder veracht / Und macht sich wider die gerüst, / Den wil ich bstehen wie wild er ist, / Schwing dich Feder, sich wie man thut, / Schreib gern mit dintn, die sicht wie Blut.*

¹⁷ Absent in the works of Ewart Oakeshott, Ortwin Gamber, Lionello G. Boccia, Ada Bruhn Hoffmeyer, and more recently in those of Jan Piet Puype and Piet de Grise or Alan Williams.

¹⁸ “[...] Fabian Büchschmieds Knecht, weil er und der Geny Ringler, des fechtmeisters vorfechter mit den fächtschwer dem einander gechlagen und blütrunss gemacht”. Zürich, Staatsarchiv, Richtbuch B.VI.248, fol. 65v. I thank Matthias Senn (Landesmuseum Zürich) for having drawn my attention to this source.

TABLE 1: Terms used to refer to the fencing swords listed in the institutional catalogues and secondary literature (denomination in brackets).

Denomination	Institution and accession number	Date	Secondary literature
Schwert (Fechtfeder, Übungsschwert)	Solothurn, Zeughaus, MAZ 313	1500– 1525	Mäder, <i>Beseelte Klingen</i> , 84–87.
Fechtschwert (Federschwert, Feder, Übungsschwert, Épée d'escrime)	Zürich, National Museum, KZ 193, 1029 and 1030	1500– 1525	Schneider, <i>Waffen im Schweizerischen Landesmuseum</i> , 118–21. Wanke, 'Anderthalbhänder – Zweihänder – Langes Schwert', p. 173. Huynh, <i>L'Épée: Usages, mythes et symboles</i> , pp. 45 and 123 (only 1030).
Bastard Foil (Fencing Sword, Practice Sword)	New York, Metropolitan Museum of Art, 14.25.IIIIO and 14.25.IIIII	1560	Metropolitan Museum, 'Practice Sword'. LaRocca, <i>The Academy of the Sword</i> , p. 27.
Spada a due mani da Sala d'Arme	Roma, Museo di Palazzo di Venezia, inv. 1265	1550– 1600	Calamandrei, <i>Armi Antiche a Gardone</i> , p. 116.

– since a fencing master's champion is involved and they fought to the “bleeding wound”, which is typical of such competitions, even if other regulations also involve fighting with no blood, which might be the reason for the fine here.¹⁹

The carnival song writer Jakob Ayser, known as the successor of the aforementioned *Meistersinger* Hans Sachs, also uses the term in one of his plays.²⁰ The same term appears in a medical treatise of [pseudo] Paracelsus (1493–1541), where the author compares the physician's knowledge to the fencer's:

Such remedies belong to us physicians, away from the hands of the commoners; thus those should not come in our hands differently than the good fencing sword (*Fechtschwert*) out of the inexperienced hands, which cannot use it. However, as when it comes into the hands of an experienced fencing master, and the fencing master performs again the form (*Parat*) with it and brings it to his own will with craftsmanship [...] ²¹

¹⁹ For bleeding wounds in this context, see Jaquet, 'Fighting in the Fightschools' and Dupuis, 'Fifteenth-Century Fencing Tournament'.

²⁰ “[...] *man tregt ihn zwei fechtschwert entgegen*.” Quoted in *Deutsches Wörterbuch von Jacob Grimm und Wilhelm Grimm* (DWB), vol. 3, col. 1392.

²¹ Paracelsus, *De Pestilitate*, 1534 (ed. Peuckert), p. 191: “Solche Arzneien gelangen aus des gemeinen Mannes Händen an uns Ärzte; sie sollen jedoch nicht anders wie ein gut Fechtschwert aus des Unerfahrenen Händen, der das Schwert nicht brauchen kann, in unsere Hände kommen, - aber wenn es in eines erfahrenen Fechtmeisters Hand kommt und der Fechter darnach die Parade schlägt, und braucht es – nach all seinem Willen – kunstvoll – so, sag ich, soll auch ein Doktor mit Arznei, kunstvoller als der gemeine Mann, zu handeln wissen.” Author's English translation. Partially quoted in Schaer, *Die altdeutschen Fechter*, p. 127. The different works of Paracelsus are filled

This quote highlights another term: “form” (*Parat*), which is in this context a sequence of technical gestures performed by the fencer, usually before a fight, as a display of martial skills.²² The term “*Paratschwert*” (parade sword) is also to be found in early modern texts,²³ but seems to indicate a parade or ceremonial weapon²⁴ rather than the actual fencing sword – although it might still be used in fencing – or maybe also to refer to the weapon used in sword dances, or the master’s symbolic sword.²⁵

In conclusion, the historical terms “fencing sword”, “parade sword”, “feather” (or quill), and “feather-blade” (*Federklingen*), but not the neologism “*Federschwert*” are all to be found in the sixteenth century literature,²⁶ although mainly in literary or narrative description including reference to different type of weapons and loaded with figures of speech, not in administrative documents or technical literature. In the latter, those weapons are mainly simply referred to as swords. The best specific *terminus technicus* is therefore “fencing sword” (*Fechtschwert*),²⁷ as chosen by Schneider in its denomination of the swords kept in Zürich²⁸ or by Seifert in his terminology.²⁹

The abundance of different terms mixing modern denominations with historical terms found in secondary literature regarding these swords is an issue in itself; the proposal of using the historical term (fencing sword) to refer to it, however, will add an additional problem. This term is in fact already in use for other (sub)types of weapon. Two swords kept in the Hofjagd- und Rustkammer in Vienna (inv. nos. A168 and A90) are denominated “*Fechtschwert*”.³⁰ One of those (A90) even has a *schilt*, but their edges and point are sharpened, while the middle of the blade is blunted, allowing the left hand to grip it. These swords

with metaphors and technical lexis of fencing. See the index of the edition of its main works in Weeks, *Paracelsus* (Theophrastus Bombastus von Hohenheim, 1493–1541). For the issue regarding authorship of the various texts ascribed to the *De Pestilitate*, see Kühlmann and Telle, *Der Frühparacelsismus*, pp. 432–33.

²² DWB: “wenn die fechter ein preaml machen, darein sie alle sprüng und kunst stück bringen, das heist man ein parat.” Examples out of 1446–1571 literature quoted in the dictionary article (online).

²³ In Fischart, *Geschichtklitterung*, p. 274b (see note 15). Other examples in Schaer, *Die altdeutschen Fechter*, pp. 125–29.

²⁴ See especially Rösener, *Ehren Tittel und Lobspruch* (1589). Quoted in Schaer, *Die altdeutschen Fechter*, pp. 174–93 and Wassmannsdorff, *Sechs Fechtschulen*, pp. 46–58.

²⁵ For the sword dance in France in the sixteenth century, see McGowan, ‘A Renaissance War Dance’. For Germany, see Ammann, ‘Nachträge zum Schwerttanz’ and Tlustý, *Martial Ethic*, pp. 217–21.

²⁶ All terms to be found in Fischart, *Geschichtklitterung* (see note 15).

²⁷ See notes 18–21.

²⁸ Schneider, *Waffen im Schweizerischen Landesmuseum*, pp. 118–21.

²⁹ “Fechtschwert: Feder, Schirmschwert (Schirmkunst - Fechtkunst); Übungswaffe, bestehend aus geradem Griff, gerader Parierstange, rundem oder birnenförmigem Knauf, ungeschärfter, im Ort gerundeter Klinge, deren deutlich verbreiterte Fehlschärfe die Klingenkanten lappenförmig überragt (Parierlappen —s. das.); Ende 15., Anfang 16. Jh.” Seifert, ‘Fachwörter der Blankwaffenkunde’.

³⁰ Thomas and Gamber, *Katalog der Leibrüstskammer*, pp. 186, 239. Wendelin Boheim (*Handbuch der Waffenkunde*) considered the A168 as a hunting sword (*Pörschwert*). Seifert, ‘Fachwörter der Blankwaffenkunde’, p. 9, considered this sword as *Panzerstecher*. Lastly, also briefly discussed in

are meant for another type of ritualised single combat other than *bloßfechten* (unarmoured fencing): single combat in armour on foot (*kampffechten*). A representation of such a sword with a *schilt* is also to be found in the fight books (Kraków, Biblioteka Jagiellonska, Germ. Quart.16, fol. 7v); in fact, this is the earliest representation of a sword with a *schilt* in the corpus. Their mechanical properties and intended use are, however, completely different from the fencing swords for unarmoured fencing discussed in this contribution.³¹

The fencing swords might also be misinterpreted as hunting swords or ceremonial weapons. The confusion is mainly due to the fact that some hunting swords also have a rectangular cross section and a mostly unsharpened blade, and sometimes a *schilt* as well. For example, a sword in the collection of the Deutsches Klingensmuseum in Solingen is also denominated “*Fechtschwert*”, but is in fact a re-assembled weapon, possibly an original hunting sword blade, with a later pommel, cross-guard and handle.³² Also inappropriate is the denomination found in the exhibition catalogue notice of a late medieval ceremonial sword belonging to the count Leonhard von Görz-Tirol, kept in Dresden.³³ One possible reason for the misleading term might be due to the fact that the collection is famous for its seventeenth-century “foot tournament swords” (“*Fußturnier Schwert*”), another type of weapon used for competitive practices, which do not correspond to those discussed in this contribution.

MECHANICAL PROPERTIES AND REPRESENTATIONS IN THE ILLUSTRATED FIGHT BOOKS

We have conducted research on three representative specimens of these fencing swords (probably produced in the same workshop) which are kept in Zürich (fig. 2) and dated to the first quarter of the sixteenth century.³⁴ We especially researched the flexibility of the blades, as their capacity to bend is one of the distinctive characteristics of this sword (sub)

Wanke, ‘Anderthalbhänder – Zweihänder – Langes Schwert’, pp. 128–29, 150 (cat. 6), who keeps the denomination of *Bohrschwert*. For a discussion about confusion with hunting swords, see below.

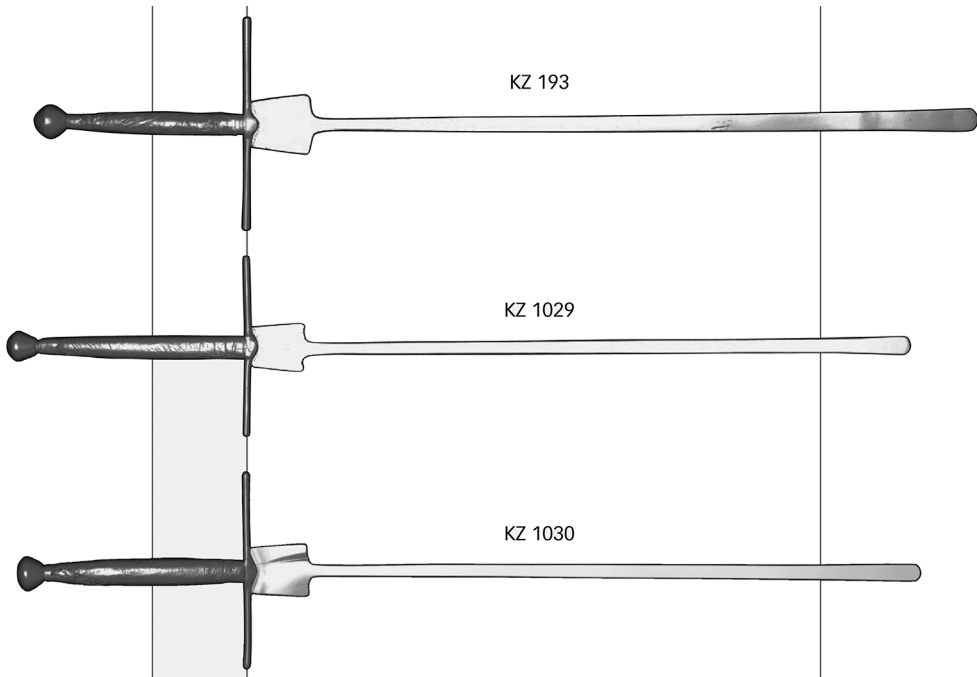
³¹ A similar sword, kept in Vienna (Stadtmuseum, HMW 126006) bears the same features, without the *schilt*. A discussion about its denomination, use, relation to the fight books and secondary literature to be found in: Jaquet, ‘Une Épée d’armes’. It must be noted as well that some later illustrated fight book exceptionally depicts fencing swords (with a *schilt* and no handle in the middle of the blade) in their armoured fighting or fighting on horseback sections (*kampf-* and *rossfechten*), see App. 13 and 19 and my comments below.

³² Inv. no. 72.W.14. Unpublished catalogue notice documenting the acquisition in 1903. Earlier provenience unknown. I thank Sixt Wetzler and Isabell Immel for the opportunity to study the sword.

³³ Dresden, Staatliche Kunstsammlung (Rüstkammer), VI 369. The notice in the catalogue is authored by Meinrad Pizzinini (in Abate, *Circa 1500-de ludo globi*, p. 141).

³⁴ Hardness test, energy selective neutron tomography assisted by computer, X-Ray fluorescence, as well as bending capacity test with light load and mathematical model to simulate heavier load, have been performed on those swords. Results will be published in the journal *Gladius* (Jaquet et al., ‘A Sword to Fence With’).

type when compared to standard longsword. We also discovered that there is a significant bending capacity in the axis of the edges, probably meant to limit the transfer of energy during strikes and therefore preventing injuries. This mechanical behaviour might explain



[units: gr/mm]	KZ 193	KZ 1029	KZ 1030
Weight	1760	1450	1380
Overall Length	1363.11	1305.62	1305.71
Blade Length (hilt block to tip)	1059.53	952.71	958.89
Blade Width (min-max)	16.14-32.37	16.80-25.52	15.72-25.46
Blade Thickness (min-max)	1.86-6.93	1.30-6.95	1.38-5.95
Schilt Length	90.45	77.41	81.12
Schilt Width (min-max)	66.90-84.73	58.03-69.96	63.48-73.05
Hilt Length (min-max)	9.94-20.76	9.37-19.346	8.59-16.38
Hilt Width	305.88	262.26	273.16
Pommel Length	47.75	46.47	43.55
Pommel Width	47.40	42.98	44.38
Pommel Thickness	47.32	42.97	44.23
Grip Length	255.48	301.231	294.92

Fig. 2: Fencing swords of Zürich (inventory no.: Kz 193, 1029 and 1030, Landesmuseum Zürich). Top: Data extracted from the 3D model (captured with ATOS Core 300) with the software GOM Inspect 2016; bottom: compared to hand measurement on the object and museum data.

the specific flared shape of the rectangular cross section blades (narrower towards the *schilt*, and larger towards the tip).

The *schilt* (forged in shape as yielded by metallographic analysis) does bring the centre of mass of the sword more towards the grip, as suggested by Wanke,³⁵ but it might not be the main reason, since it also strengthens the structure against bending stresses. Mechanical considerations aside, the main feature of the *schilt* is to protect the fencer's hand and allow them to use complex grips, including placing the thumb on the *schilt*, as represented in many of the illustrated fight books.³⁶ Finally, the point, flattened to a rounded shape, prevents penetration of the blade, but still allows blood to be drawn on impact for those competitive fighting practices fought to the highest bleeding wound.³⁷

We believe that these swords were designed to prevent fatal injuries (penetration of the blade due to thrusting actions and to lessen the impact of a cutting motion). Both the specific shape of the blade (allowing for the bending capacity) and the *schilt* (protecting the hands and strengthening the structure), as well as the "blunted" tip, are features that are represented in the illustrated fight books.

Wanke offered a contribution analysing the depiction of the different types of weapon represented in the illustrated fight books.³⁸ His discussion about the fencing swords is, however, limited to one paragraph. He did however note that fencing swords are to be found represented in the corpus as a primary type (as opposed to the two identified earlier types of longsword) from the end of the fifteenth century, albeit with some earlier examples, namely in the fight book compiled by Peter von Danzig dated to 1452 (app. 2).³⁹

A list of the fight books from 1435 to 1679 where fencing swords are depicted is presented in the appendix. The observation of Wanke about such swords being very well represented compared to standard longsword from the end of the fifteenth century onwards is confirmed, but must still be quantified. It is worth noting that some of the sections detailing unarmoured fencing with the longsword (*bloßfechten*) are depicted with standard longwords,⁴⁰ with

³⁵ Wanke, 'Das Schwert im Spiegel der Fechtbücher', p. 83.

³⁶ This grip (thumb on the *schilt*) eases complex movement of the wrist, for example for false (or short) edge alignment in cutting motions. Two very nice examples can be seen in Hans Medel (App. 19, fol. 2r and 7r).

³⁷ Regarding bleeding wounds in this context, see Jaquet, 'Fighting in the Fightschools' and Dupuis, 'Fifteenth-Century Fencing Tournament'.

³⁸ Wanke, 'Das Schwert im Spiegel der Fechtbücher'.

³⁹ Ibid., p. 173. He also discusses briefly (note 11) the appendages on the cross-guards depicted on earlier types of longsword (so called rain-guard), as a proto-ricasso of the fencing swords (protecting the hands). The subject is debated and would deserve further research. About this matter, see: Baptiste, 'Cover-guards, Copellet or Chapé'.

⁴⁰ This is the case for the following Fight Books (ranged by dates with author/compiler and referred to by repository): Anonymous 1420/1470 (Augsburg, Universitätsbibliothek, Cod.I.6.4.º.2); Hans Talhoffer, 1448 (Erfurt, Forschungsbibliothek, MS Chart.A558); Hans Talhoffer, 1446–1459 (Königseggwald, Königsegg-Aulendorf collection, MS XIX 17-3); Hans Talhoffer, c.1450 (Berlin, Kupferstichkabinett, MS 78.A.15); Hans Talhoffer, 1459 (Kobenhavn, Det Kongelige Bibliotek, MS Thott 290.2º); Paulus Kal, 1460–1480 (Bologna, Biblioteca Universitaria, MS

fencing swords (app. 3, 6, 7, and 14–34), or with a mix of the two (app. 1, 2, 4, 5, 8–13, 15, 21, and 34). The last section depicted with only standard longsword dates from the early sixteenth century (Wien, Albertina, MS 26-232), whereas such swords are still represented alongside fencing swords until the end of the period under consideration (1679, see app., 34). The opposite is also observable: there are early fight books where the relevant sections are depicted solely with fencing swords (App. 3 (1465) and 6–7 (1495)). Therefore, dating the swords kept in the museum according to the dating of the representations of this sword (sub)type in the fight books is disputable, since their depiction spans between 1452 until 1679, with a peak in the early sixteenth century.

Representations of fencing swords with a *schilt* belonging to another type (as in the depiction of the Gladiatoria mentioned above, or early rapiers in app. 19, lib. II P3r and liber III B2r, C3r) put aside, we also find fencing swords represented outside of the sections dedicated to unarmoured fencing with swords. Two noticeable exceptions can be seen here: one in the section regarding armoured fighting on horseback of Jörg Wilhalm from 1522 (app. 13, fol. 28rv) and one in the section about armoured fighting on foot by Antonius Rast from 1540 (app. 21, fol. 57r). These exceptions might be interpreted as discrepancies, possibly due to artists' errors, but further research would be needed to assess this issue. It must be noted, however, that the representation of fencing swords alongside standard longswords during the entire period (see the list above) also raises questions about this matter. Moreover, for the case of the fight books attributed to Hans Talhoffer (five different versions during his supposed lifetime, without taking the later copies into consideration),⁴¹ we can see that the earlier four versions (1448–1459)⁴² depict only standard longswords, whereas the last version (1467, see app. 4) includes four pairs of fencers equipped with fencing swords, as opposed to the sixty-two other pairs with standard longswords. Therefore, it is disputable to hypothesise about potential authorial intent behind the representation of the weapon, especially when the production modalities of the manuscript (or print) and its different actors have not been researched.⁴³

The representation of fencing swords in the corpus undoubtedly shows a connection between the authors, artists, or patrons involved in the realisation of the fight books and the intended audience with the fencing schools and the fencing guilds. Without careful research endeavours to identify the production modalities for each fight book (author, scribe, artists, patron, workshop, etc.), however, arguments for a specific context of application for a specific fight book based only on the analysis of the representation of the weapons are disputable.

1825); Paulus Kal, 1470 (München, Bayerische Staatsbibliothek, Cgm 1507); Philippo di Vadi, 1482–1487 (Roma, Biblioteca Nazionale Centrale, MS Vitt.Em.1324); Ludwig von Eyb, c. 1500 (Erlangen, Universitätsbibliothek, MS B.26); Albrecht Dürer (?), 1512 (?) (Wien, Albertina, MS 26-232).

⁴¹ Cf. Burkart, 'Die Aufzeichnung des Nicht-Sagbaren'.

⁴² See note 40.

⁴³ The same is true for the representation of armour. For a discussion about the wrong type of defensive equipment representation based on the confrontation between representation and realia, see Baptiste, 'L'Armure et ses Typologies'.



FIG. 3: Triumphzug des Kaisers Maximilian I., 1526. Related textual commentaries: “Herr Hans Hollywars solle Vechtmaister sein vnd sein Reim auf die maynung gestelt werden: Wie er hab nach adenlicher Art das gefecht aus des kaisers öffnung an seinem hof aufgericht. [...] Fünf personen mit swertern in den Schaidten vber die Achseln.”

Other representations of fencing swords are to be found outside of the fight book corpus. For example, the Emperor Maximilian I, himself an avid practitioner of chivalric games and keen on displays of martial skill, is connected to two illustrations of fencing swords: one in the *Weisskunig*,⁴⁴ and one in the *Triumphzug* (fig. 3).⁴⁵ There are of course other examples,⁴⁶ but all bear the same features (long grip, *schilt*, straight cross-guard, rounded or square tip). Nonetheless, differences in the details of the representations, both in and outside the corpus of the fight books can be noticed over time, such as the length and shape of the blade, the shape of the *schilt* and the type of pommel, handle, or cross-guards. A careful analysis of this large corpus, compared to a detailed study of the known specimens in arms and armour collections might lead to the establishment of a more comprehensive categorisation of these swords. This lies outside of the scope of this contribution and would require further research.

⁴⁴ Reproduced in Huynh, *L'Épée. Usages, mythes et symboles*, p. 52.

⁴⁵ See the review of secondary literature in Haag et al., *Kaiser Maximilian I.*

⁴⁶ Amongst others, the *Trachtenbuch* of Matthaeus Schwarz (see Jaser, ‘Ernst und Schimpf’, p. 221), and the *Hausbuch* of Schloss Wolfegg (reproduced in Jaquet, ‘Fighting in the Fightschools’, p. 57). Noteworthy are the several engravings of Virgil Solis (1514–1562), depicting fencing schools, not reproduced in any publication that I know of.

CONCLUSION

The review of the secondary literature and the analysis of the denomination of the remaining specimens in collections, which has been compared to research on historical terminology, has laid bare the basis for understanding the confusion caused by the variety of unstandardised denominations found for the swords in question. The most proper term to denominate this (sub)type is therefore “fencing sword” (“*Fechtschwert*”), even if it is also used to denominate other minor (sub)types, and sometimes mistakenly.

Based on a parallel study of three representative examples kept in Zürich, I have proposed an outline of the mechanical properties of these swords. It allows us to explain the specific features of the weapon: the *schilt*, and the flared blade of a rectangular cross section terminated by a flattened tip, which is wider than the base of the blade after the *schilt*. The rest of the features; the length of the blade, specific bending capacity, the length of the grip, and the shape of the tip can be explained by the analysis of the technical literature describing and illustrating its use (fight books), as well as the study of the competitive fencing practices in urban contexts.

The fact is that this corpus presents a vast amount of information for fencing swords in contrast to the very few identified specimens in collections. I believe that there are many more of those swords kept in the deposits of the arms and armour collections worldwide, but they are unavailable for research since there is almost no published research and no accepted terminology to denominate them.

Large avenues for future research are open. If all other known specimens bear the same visual characteristics, only three have been carefully studied. The question of whether this theory about mechanical properties would apply to other specimens is left open for further investigation. The exhaustive analysis of the representation of this (sub)type, in and out the corpus of fight books, is also left to be done and might lead to the establishment of a more comprehensive categorisation of fencing swords.

ACKNOWLEDGEMENTS

The paper presented at the conference was about preliminary results of a research project on the three fencing swords kept in Zürich. These preliminary results have been touched upon in this written contribution, whereas the final results will be published together with the team of researchers in the journal *Gladius* (article in preparation).

This contribution is indebted to independent researchers from the communities of Historical European Martial Arts practitioners. Amongst others, Roger Norling needs to be thanked. He offered several blogposts about this specific sword-type and its terminology, as well as an open call for contributions aiming at identifying such swords in arms and armour collection worldwide.

APPENDIX: REPRESENTATIONS OF FENCING SWORDS IN THE ILLUSTRATED FIGHT BOOK CORPUS

The manuscripts and prints are listed chronologically by the date given by the institution of conservation (or revised according to the latest published research). Most of these sources do not have original titles and their authorial attribution is a matter of debate. Alternative titles or disputable attributions are signalled by square brackets. The references to representations of fencing swords are given by foliation (MS), pages (prints) or by numbered plates when pagination or foliation are unavailable or doubtful.

Acknowledgement: this appendix is based on research published online by Roger Norling,⁴⁷ but has been revised and augmented by the author.

No	Author, title	Repository / printing location	Date	Representation of fencing sword
1	Anonymous, [Gladiatoria]	Kraków, Biblioteka Jagiellońska, MS Germ. Quart.16	1435–1440	7v
2	Misc. [Peter von Danzig], s.t.	Roma, Accademia Nazionale dei Lincei, Cod.44.A.8	1452	2v
3	Anonymous, s.t.	Wolfenbüttel, Herzog August Bibliothek, Cod. Guelf.78.2.Aug.2 ^o	1465–1480	2r–14v, 17r–28v
4	Hans Talhoffer, s.t.	München, Bayerische Staatsbibliothek, Cod. icon. 394a	1467	2r–3v
5	Paulus Kal, s.t.	München, Bayerische Staatsbibliothek, Cgm 1507	c.1470	58r–67r,
6	Anonymous, s.t.	Paris, Musée National du Moyen Âge, Cl. 23842	c.1495	12r–57v
7	Peter Falkner, <i>Kunste zu Ritterliche were</i>	Wien, Kunsthistorisches Museum, MS KK5012	c.1495	2r–17v
8	Anonymous, s.t. [copy of Paulus Kal]	Solothurn, Zentralbibliothek, S. 554.	1506–1514	73–77, 82–93, 100 (plates)
9	Anonymous, s.t.	Glasgow, Kelvingrove Centre, MS E.1939.65.341	1508	1r–2v, 3v–4v, 14v–17r, 19rv
10	Anonymous, [Goliath]	Kraków, Biblioteka Jagiellońska, MS Germ. Quart.2020	1510–1520	11v, 13r, 16v, 17r, 22r, 31r, 34v, 54r
11	Anonymous, s.t.	Berlin, Staatsbibliothek, Libr. Pict. A83	c.1512	7v, 8v, 10r, 11v, 12v, 13rv, 14v, 15v, 17rv, 27v

⁴⁷ Norling, 'Fechtschwert'.

No	Author, title	Repository / printing location	Date	Representation of fencing sword
12	Andre Paurneindt, <i>Ergründung Ritterlicher Kunst der Fechterey</i>	Wien, Hieronymos Vietor	1516	A3v, A4v, B1v, B2v, B3v, B4v, C1v, C2v, C3v, D1v, D3v, E1v, E2v, F1v, F2v, F3v, F4v
13	Jörg Wilhalm, s.t.	Augsburg, Universitätsbibliothek, Cod.I.6.4°.5	1522	28rv
14	Jörg Wilhalm, s.t.	München, Bayerische Staatsbibliothek, Cgm 1507	1523	2r–42r
15	Misc. (Jörg Wilhalm and Lienhart Sollinger), s.t.	Augsburg, Universitätsbibliothek, Cod.I.6.2°.2	1523/1564	1r–41v, 51r–52v, 53v, 60v–61v, 62v, 64v, 66r–67v, 68v–69v
16	Gregor Erhart, s.t.	Glasgow, Kelvingrove Centre, MS E.1939.65.354	1533	3v–64v (only verso)
17	Anonymous, <i>Der Altenn Fechter gründtliche Kunst</i>	Frankfurt am Main, Christian Egenolff	1530/31 (4 known ed. > 1558)	B1–3(v), C1–2(v)
18	Anonymous, <i>La noble science des ioueurs despee</i>	Anvers, Guillaume Vorsterman	1538	A1rv–4(v), B1–4(v), C1–3(v), D1–4(v), E1–4(v), F1–2(v)
19	Misc. [Hans Medel and Maarten van Heemskerck], s.t.	Augsburg, Universitätsbibliothek, Cod.I.6.2°.5	1539/1552	23r, 24v, 25v, 26r, 27r, 29r, 30v, 31r, 31v, 34r, 37v, 38v, 39r, 40r, 41r, 42r, 43v–45r
20	Misc., <i>Maister Liechtenawers Kunstbuech</i>	München, Bayerische Staatsbibliothek, Cgm 3712	1540–1556	97r–136r
21	Misc. [Antonius Rast], s.t.	Augsburg, Stadtarchiv, Reichsstadt “Schätze” Nr. 82	1540–1553	44r–57r
22	Paulus Hector Mair, <i>Opus Amplissimum de Arte Athletica</i>	Wien, Österreichische Nationalbibliothek, cod. 10825	1542–1550	1r–68v
23	Paulus Hector Mair, s.t.	Dresden, Sächsische Landesbibliothek, MS Dresd.C.93	1542–1550	22r–81v
24	Misc., s.t. [ill. Jörg Breu]	Augsburg, Universitätsbibliothek, Cod.I.6.2°.4	1545	16v–33v
25	Paulus Hector Mair, <i>Opus Amplissimum de Arte Athletica</i>	München, Bayerische Staatsbibliothek, Cod. icon. 393a	1550	18r–77v, 165r
26	Anonymous, s.t.	Private coll. (Amberger, US)	c.1550	14r

No	Author, title	Repository / printing location	Date	Representation of fencing sword
27	Camillo Agrippa, <i>Trattato di Scientia d'Arme</i>	Roma, Antonio Blado	1553	Libr. II, cap. XV
28	Joachim Meyer, s.t.	Lund, Universitets Bibliotek, MS A.4 ^o .2,	1560	12v, 14r, 15r, 16v, 18v, 21r, 22v, 28r, 29v, 31v, 34r, 36r, 38r, 40r
29	Joachim Meyer, <i>Gründliche Beschreibung der freyen Ritterlichen und Adelichen kunst des Fechtens</i>	Strassburg, Thiebolt Berger	1570	Liber I: A3r, B2r, B3r, B4v, C3r, D1v, E1r, E3r, G3r, H4v, I2r, K1r, K4r, L1v, L3v, M2v, M4r, N1r, N4r, O4r, P1v, P2v. Liber II: B4r,
30	Anonymous, <i>Das Ander Theil Des Newen Künstreichen Fechtbüches</i>	Wolfenbüttel, Herzog August Bibliothek, Cod. Guelf.83.4.Aug.8 ^o	1591	2r–20r
31	Jakob Sutor von Baden, <i>New Künstliches Fechtbuch</i>	Franckfurt am Mayn, Johan Bringern	1612	A1v, A2v –C2r
32	Misc., <i>Büch von fechter Vnnd Ringstückhen zů Ross vnnd Fuoß</i>	Wien, Österreichische Nationalbibliothek, cod. 10799	1623	9–59(r)
33	Gérard Thibault d'Anvers, <i>Academie de l'Espée</i>	Leiden, s.e.,	1630	[np] Frontispiece, Pl. 9–11
34	Theodori Verolini, <i>Der Künstliche Fechter</i>	Würzburg, Joann Bencard	1679	C1–3(r), D2r

II

Metallurgy and Production

Phosphoric Iron and Welded Patterns

The Reconstruction of an Early Medieval Sword from Beckum

Ulrich Lehmann, Stefan Roth and Claus Lipka

THIS PAPER APPROACHES THE modern reconstruction of a double-edged *spatha* found in the early medieval cemetery of Beckum (North Rhine-Westphalia in Germany), grave 68. The burial can be dated to the middle of the sixth century A.D. Information about the construction of the pattern-welded blade and the forged metal components were gathered mainly with computed tomography scans as well as metallographic and chemical analyses. These examinations proved that the weapon was of elaborate manufacturing quality and consisted of low carbon steel (for the cutting edges) and phosphoric iron as well as pure iron (for the composite rods).

All the metal used for the modern reconstruction of the Beckum blade was produced in a bloomery furnace. Its chemical composition was verified with mobile X-ray fluorescence analysis. The replica gives a realistic impression of the once existing state of the Beckum sword. It matches the archaeological find not only in overall measurements and surface patterns, but also in constructional details like the number of layers and twists of the composite rods. As a result, it becomes clear that the structure of the composite rods must have been more complex than is generally accepted. The immense amount of labour required and metal and fuel consumed shows that the status of these early medieval weapons, as well as the skill of the contemporary smiths, cannot be overestimated.

The pattern-welded double-edged sword of the early Middle Ages, the so-called *spatha*, has been scientifically examined for quite a long time. While archaeologists have concentrated mostly on typological and chronological matters,¹ the construction, material properties and manufacturing process of these blades were also analysed, often by natural scientists and conservators.² Due to modern examination methods, primarily X-ray computed tomography (see below) and detailed studies (such as the brilliant analysis of a double-edged

¹ E.g. Behmer, *Zweischneidiges Schwert*; Geibig, *Morphologische Entwicklung*; Menghin, *Das Schwert*; Petersen, *De Norske Vikingsverd*.

² E.g. Böhne and Dannheimer, 'Studien Wurmbuntklingen'; Emmerling, 'Eiserne Bodenfunde'; France-Lanord, 'Fabrication des Épées'; Neumann, 'Römischer Damaststahl'; Pleiner, *European Blacksmiths*; Tylecote and Gilmour, *Metallography*; Westphal, *Franken oder Sachsen*; Ypey, 'Europäische Waffen'.

sword from Neudingen³), the secrets involved in the production of an early medieval spatha have been gradually and increasingly revealed. Despite several attempts,⁴ however, a modern reconstruction which remained true to the original as far as the alloys used and visibility of patterns on the blade were concerned had not been created. This was the task for the following archaeological experiment.

REMARKS ON THE CONSTRUCTION AND THE MANUFACTURING QUALITY OF A PATTERN-WELDED BLADE

The general manufacturing process of the “pattern-welded” blade, a term that was introduced in archaeology by Herbert Maryon in order to distinguish European forge-welded swords from damascened weapons of the Middle East, has been known for many decades.⁵ The work of Jaap Ypey is also very prominent in this regard, at least in the German-speaking area.⁶ He stated that the pattern-welded blade of the early Middle Ages consists of separately produced cutting edges and a varying number of so-called composite rods. These were built up of layers of two different alloys that were alternately stacked, welded in the forge and hammered out. After that the rod is twisted as a whole, or only in limited areas (fig. 1). When ground and polished, shimmering patterns come to light on the surface and in the untwisted areas simple parallel lines are visible. The twisted sections can display a range of different structures depending directly on the amount of material removed.⁷ While slanted lines are depicted on the outside of the complete composite rod, at about 50% of the original thickness curving patterns become visible in a very thin layer (fig. 2).

In the past, various examinations, first of all metallographic analyses,⁸ proved that blades with different cross-sections were produced. Three main types of blade composition can be distinguished.⁹ The first type consists of one layer of composite rods. The second type is built up of two layers of composite rods. The third type comprises two layers of composite rods that are welded to a thin core material. In some cases, the cutting edges and core material are made of the same piece. Other types of construction are far less frequent. At least a few blades possess a core material consisting of two parts.¹⁰ There are also large differences in the overall number of elements. In addition to the cutting edges, pattern-welded blades could be

³ Mäder, *Stähle, Steine und Schlangen*, pp. 107–45.

⁴ Amrein and Binder, ‘Hammer und Zange’; Anstee and Biek, ‘Pattern-Welding’; Pelsmaecker, *Weapons of Princes*.

⁵ Maryon, ‘Sword of Nydam Type’, p. 76; ‘Pattern-Welding’, p. 26.

⁶ Ypey, ‘Damaszierte Waffen’; ‘Europäische Waffen’; ‘Damaszierung’.

⁷ Ypey, ‘Damaszierte Waffen’, p. 13, fig. 5.

⁸ See e.g. Tylecote and Gilmour, *Metallography*.

⁹ Lehmann, *Konstruktion, Herstellung und Wertigkeit*, pp. 146–49; mainly depending on Emmerling, ‘Eiserne Bodenfunde’, pp. 303–6.

¹⁰ Böhne and Dannheimer, ‘Studien Wurm-buntklingen’, pl. 14.1.

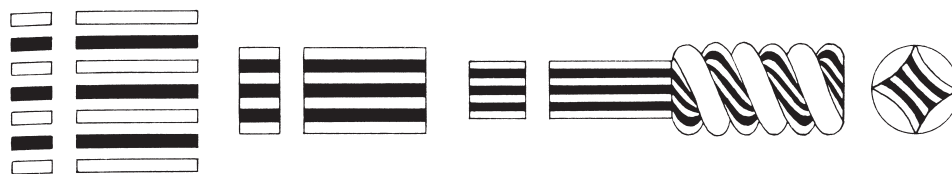


FIG. 1: The production of a composite rod after Jaap Ypey. 1–2: Package of seven layers made of two different alloys. 2: The welded layers. 3: The forged rod becomes twisted in a limited section. 4: Cross-section of a composite rod.



FIG. 2: A composite rod made of ten layers of two different alloys that was ground to 75% (middle) and 50% (right) of the original thickness.

made from a single – as the weapon from Warburg-Ossendorf, grave 1 proves¹¹ – or no less than twelve composite rods, as depicted in an X-ray image of a sword from Acklam Wold.¹² Employing twisting and grinding, the smith was able to produce numerous variations of visible surface ornaments.

Today the complex structure of pattern-welded blades has in many cases become invisible because of corrosion and by the often extensive albeit decomposed remains of scabbards covering the blades. Even when using radiography or destructive examination methods like metallography, information about many technical details is hard and sometimes impossible to obtain.¹³ Thus, non-destructive digital computed tomography is an important tool that is being applied more and more to the study of early medieval swords.¹⁴ The 3D model that is created from the CT scan displays differences in density of the examined object, respectively the scanned area. As all parts of the sword, including the diverse metal alloys the blade consists of, are not affected in the same way by corrosion, numerous constructional details

¹¹ Lehmann, *Konstruktion, Herstellung und Wertigkeit*, pp. 406–7.

¹² Gilmour, 'Ethnic Identity', p. 100, fig. 8.

¹³ Lehmann, *Konstruktion, Herstellung und Wertigkeit*, pp. 27–30, 35–38; see also Lehmann, 'Pattern-Welded Swords', pp. 271–72.

¹⁴ E.g. Röber, 'Spatha aus Mannheim'; Stelzner, Gauß and Schuetz, 'X-ray Computed Tomography'; Wulf and Lehmann, 'Ulfberht-Schwert'.

can be observed. For example, a reconstruction of the once visible patterns is possible, even if the surface is already gone. Furthermore, layer thicknesses as well as the number of twists in a limited area of the composite rods can often be measured.¹⁵

While material properties of the swords can only be determined with metallography, chemical analyses and mechanical tests, the above-mentioned aspects provide important information concerning the manufacturing quality of the blade. From 2012 to 2014 a research project approaching the construction, manufacturing process and material quality of the early medieval spatha was conducted by the Altertumskommission für Westfalen in close cooperation with the LWL-Archäologie für Westfalen. Some preliminary results were presented at the symposium *Das Schwert – Symbol und Waffe*, which took place in Freiburg in autumn 2012.¹⁶ Among other examination methods the study depended first and foremost on digital computed tomography. Altogether twenty-eight double-edged swords from Westphalia, coming from documented graves, and four additional weapons were analysed. All swords are dated to the sixth to eighth century A.D. Although chronological tendencies in the construction can be stated, almost all weapons show essential similarities: their blades consist of two layers of composite rods which were ground to half of their original thickness. Therefore, in all the twisted areas of the welding packages, curving patterns were visible on the blades' surfaces.

Despite this conformity many differences in technical details, which are automatically displayed in the welding patterns, become obvious. It is a widely known fact that the visible patterns of the blade convey an impression of the manufacturing quality of the weapon.¹⁷ Nevertheless firm criteria to judge this aspect have mostly been missing. A crucial point seems to be the differentiation not only between "good" and "bad" but also between "simple" and "complex" as well as between "easy" and "hard", or "elaborate".¹⁸ There are at least four aspects worth mentioning. Firstly, the overall number of elements is important. With every component that has to be produced the required effort rises. This automatically leads to the second point. Because of the limited blade size a higher number of elements means that at least some of these, especially the composite rods, have to become smaller. Rods with a thin cross-section are much harder to work as there is a growing danger of overheating, deformation and even breaking during the twisting. Furthermore, the metal is cooling faster, so more heatings are required, fault tolerances are reduced and the enlarged surface in relation to the mass leads to a higher material loss due to burn-off. Thirdly, the number of twists is an indicator for manufacturing quality: the more a rod is twisted, the more heatings have to be performed. An increased number of twists also heightens the danger of breaking the rod. Fourthly, the uniformity of the rotation and of the size of twisted and straight areas was very important. Examinations of the patterns indicate that the smiths tried to produce ornamented fields equal in size. To achieve this, the smiths paid scrupulous attention to

¹⁵ Lehmann, *Konstruktion, Herstellung und Wertigkeit*, pp. 163–64.

¹⁶ Lehmann, 'Klinge Spatha'; *Konstruktion, Herstellung und Wertigkeit*.

¹⁷ Emmerling, 'Eiserne Bodenfunde', p. 302; Gilmour, 'Ethnic Identity', pp. 68–69; Westphal, *Franken oder Sachsen*, p. 6; Ypey, 'Damaszierung', p. 211.

¹⁸ Lehmann, *Konstruktion, Herstellung und Wertigkeit*, pp. 236–38.

matching the twisted and straight sections of multiple rods exactly when composing a blade. Complete uniformity in the twistings and transitions in the patterns on exactly the same level, however, were hard to achieve, especially with blades consisting of eight or more rods. Such a process required thorough planning. The high difficulty must have been a strong stimulus for experienced smiths to create complex blades. The result of their effort inevitably showed on the surface. The craftsmanship of the patterns was easy to judge for anyone who knew what to look for.

THE SWORD FROM BECKUM

The modern reconstruction was based on the model of the sword from Beckum I, grave 68. The weapon was found as early as 1863. Its blade is preserved in three fragments (fig. 3). The sword was part of an inhumation burial that can be dated to approximately the middle of the sixth century A.D. if not earlier.¹⁹ It is the only weapon that, apart from thorough CT scans, has also been examined metallographically and chemically in the aforementioned research project.



FIG. 3: The sword from Beckum, grave 68, not to scale.

The examinations provided a lot of relevant information.²⁰ At the time of the excavation the sword possessed a length of approximately 890mm. The preserved width (44mm) and thickness (4mm) of the blade correspond very closely to the original state of the find. The tang has a length of 118mm.

Only few residues of the organic scabbard and grip construction have survived. The scabbard was made of two hardwood boards lined with bovine hide. The grip possessed a handle, a cross-guard and a pommel. It was not possible to determine the organic material although it would have most likely been wood.

The structure of the blade became accessible due to the CT scans. It consists of at least ten different components. Both cutting edges were 10mm wide in the cross-section. The body of the blade is built up of two layers of four composite rods each that have been ground to half their original thickness and are twisted in limited areas of roughly 50mm in length. Thus, curving patterns and parallel lines alternated on the surface. Nevertheless, the front and back of the blade presented a different order of ornamented fields. The straight and

¹⁹ Brieske, 'Tradition und Akkulturation', p. 125 with fig. 3, p. 126, fig. 4.1; Capelle, *Gräberfeld Beckum I*, p. 33, pls. 28–29; Lehmann, *Konstruktion, Herstellung und Wertigkeit*, p. 62.

²⁰ See also Lehmann, 'Pattern-Welded Swords', pp. 273–75; *Konstruktion, Herstellung und Wertigkeit*, pp. 160–66, 378–79, 422–23 and tab. 4–5.

twisted sections of the neighbouring rods composing the front all correspond to each other, thus forming broad pattern-fields. The rods building the back of the blade are arranged in a checkerboard-manner, alternating straight with twisted sections throughout the length and breadth of the blade (fig. 4). As far as measurements could be taken, a relatively high rate of twisting (five full rotations in a length of 50mm) was observed. On the surface of the blade the width of the rods was 6mm. The inspection of the inner blade made clear that adjacent parts were always twisted in opposite directions. Furthermore, the welding packages each consist of seven layers from two different kinds of metal, one of these possessing a minor density. As a result, this alloy was displayed in a darker colour in the CT scans. The images of the frontal sections also presented detail that at the first glance seemed rather unremarkable: the filling of the curving patterns has the shape of a full circle. As will be shown later, this aspect bears far-reaching consequences for the structure of the welding packages.

For metallographic examinations, two slices of the blade approximately 180mm above the point were removed, embedded in epoxy resin and polished. The cut surface was etched with a nitric acid of 3% and analysed with a reflected-light microscope (fig. 5). The cutting edges consist of ferrite with a relatively small grain size and perlite. The carbon content is about 0.4%. Partially visible horizontal layers might derive from the folding of the metal. Fine and lighter lines reaching from the body of the blade to the tip show more slag inclusions and elongated horizontal grains, probably indicating welding seams. This makes it seem possible that both cutting edges consist of two or maybe even three diverse elements; the differences in the carbon content, however, are rather small, so if various components have been used to

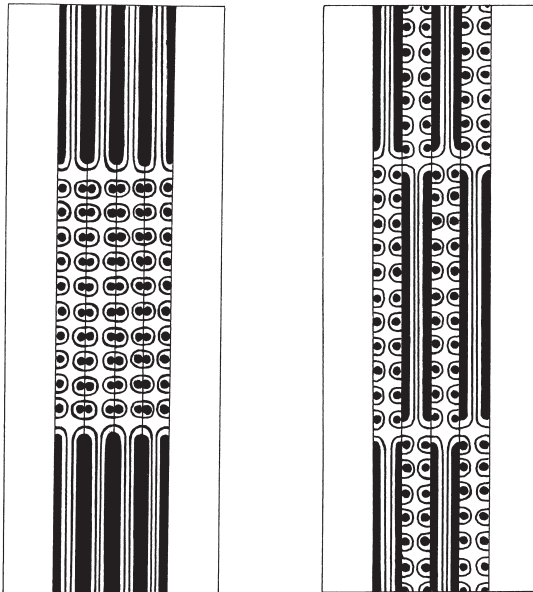


FIG. 4: Structure and once visible welding patterns on the Beckum blade on the basis of the CT scans, not to scale.



FIG. 5: Etched cross-section of the blade from Beckum, not to scale.

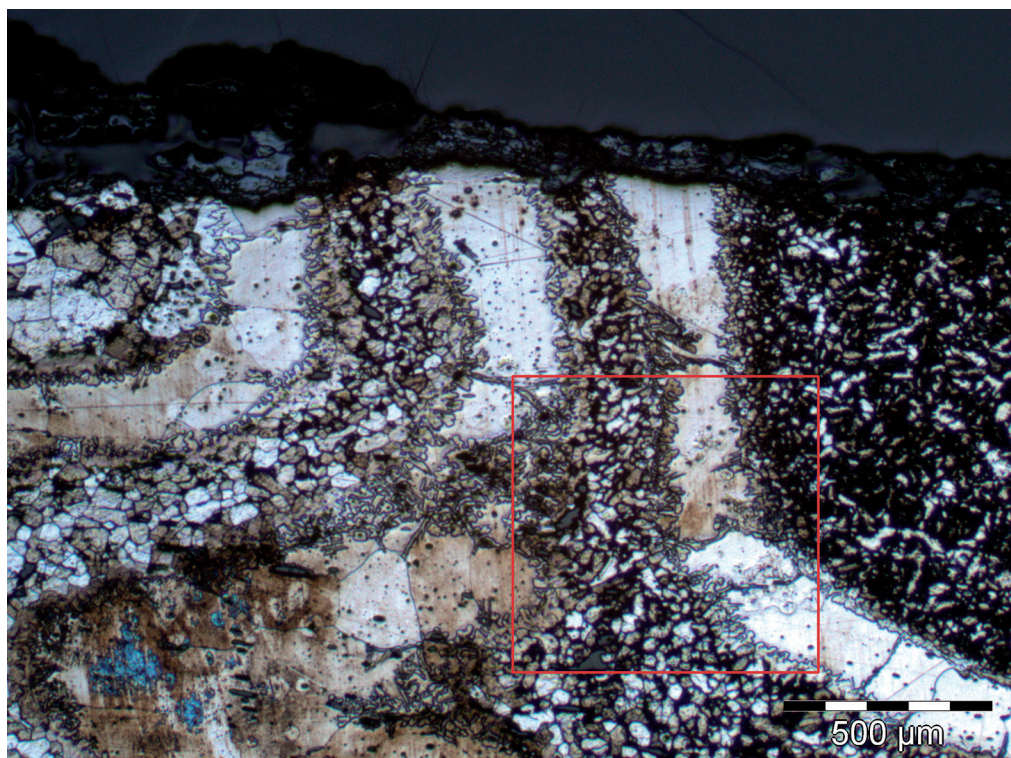


FIG. 6: Detail of etched cross-section showing one of the composite rods in an untwisted area. The red box marks the analysed area in fig. 7.

form the cutting edges then these most likely derive from the same base material. There were no indications of heat treatment to harden the metal. A very slight decarburisation may have occurred, as the carbon content in the centre of the cutting edges is a little bit higher than on their surface. All of the eight composite rods that were observed in the CT scans could be easily distinguished by their construction and the welding seams between the parts. Every rod consists of seven layers of two different kinds of metal (fig. 6). The four darker areas show ferrite with small grain sizes (with an average of c. 50μm in diameter). Only next to the cutting edges can perlite be observed. This indicates that carbon must have diffused from there into the ferritic parts of the composite rods. The three lighter areas show ferrite with very large grains (up to 500μm in diameter and more). No perlite is existent in these layers. At the grain boundaries a shadowy relief appears.

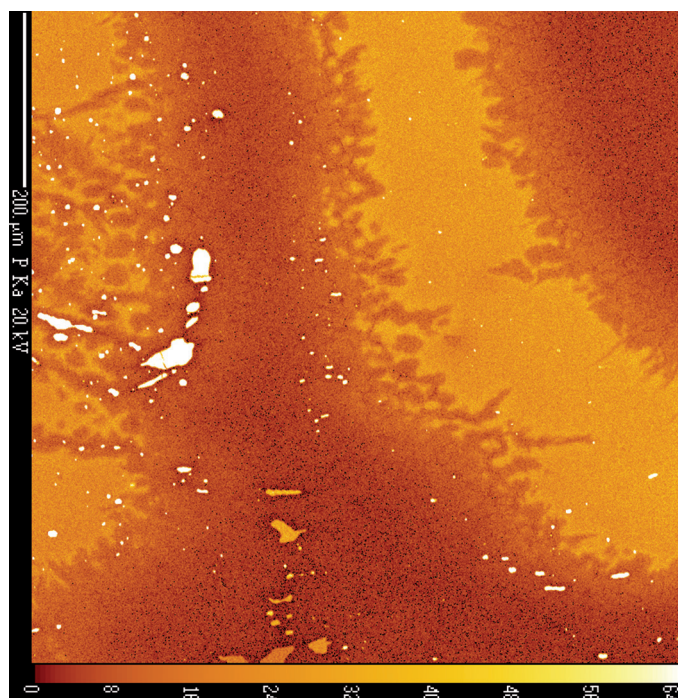


FIG. 7: Mapping of phosphorus in a limited section of one of the untwisted composite rods (see red box in fig. 6). The alloys can be differentiated between by the brightness of the colour. White areas indicate slag inclusions.

Vickers hardness tests were performed on the specimen.²¹ The measured values of the cutting edges lie between 166 and 224 HV 3. The hardness in the darker areas of the composite rods is 155–170 HV 3 and in the lighter areas 180–204 HV 3.

After that the same specimen was repolished and chemically analysed by an electron microprobe.²² Only iron, phosphorus, silicon, cobalt²³ and arsenic were detected (table 1). High amounts of silicon derive from slag inclusions. In other cases, the content lies below 0.1%. The constant amount of cobalt (about 0.1%) originates most probably from the preparation of the specimen. The arsenic content frequently lies between 0.00% and 0.05%, while higher amounts (up to 0.2%) correspond at least in some cases with slag inclusions. The two alloys in the composite rods mainly differ in their content of phosphorus (fig. 7). One material, which is depicted darker in the metallography as well as the CT scans, regularly possesses a content of up to 0.1% P. The other alloy shows an amount of 0.7–0.8% P. The phosphorus content of the cutting edges was 0.05% and less (with one exception of slag inclusion). The highest amounts of arsenic were determined in this area.

The Beckum blade was of a high, but not the best manufacturing quality. The composite rods were forged of seven layers of two alloys that differ in their content of phosphorus. The characteristics of this element in ancient iron are not yet totally clear.²⁴ In modern industry

²¹ See also Lehmann, *Konstruktion, Herstellung und Wertigkeit*, pp. 164–65.

²² See also *ibid.*, pp. 165–66.

²³ Not chromium as in Lehmann, *Konstruktion, Herstellung und Wertigkeit*, p. 165.

²⁴ See also *ibid.*, pp. 213–14.

TABLE 1: Results of the chemical examination of the composite rods (1–34) and the cutting edges (35–50). For the position of the measured points, see Lehmann, *Konstruktion, Herstellung und Wertigkeit*, pl. 110-112 (this table was accidentally omitted there).

Comment	Si	Ti	Cr	Fe	Mn	P	Co	Ni	Cu	Zn	As	Mo	Total
Spatha_001	0.04	0.00	0.00	97.10	0.00	0.60	0.11	0.04	0.00	0.00	0.04	0.01	97.94
Spatha_002	0.03	0.00	0.00	99.17	0.01	0.46	0.11	0.01	0.00	0.00	0.00	0.01	99.80
Spatha_003	0.03	0.00	0.00	98.22	0.00	0.34	0.10	0.03	0.00	0.01	0.06	0.00	98.79
Spatha_004	0.02	0.00	0.00	99.84	0.00	0.06	0.11	0.01	0.03	0.00	0.06	0.00	100.13
Spatha_005	0.02	0.00	0.00	100.72	0.00	0.06	0.09	0.01	0.02	0.00	0.08	0.00	101.00
Spatha_006	0.02	0.00	0.00	98.80	0.00	0.09	0.10	0.01	0.03	0.00	0.04	0.00	99.09
Spatha_007	0.04	0.00	0.00	99.80	0.00	0.11	0.09	0.01	0.00	0.01	0.00	0.00	100.06
Spatha_008	0.91	0.06	0.01	96.06	0.01	1.26	0.10	0.02	0.03	0.00	0.10	0.00	98.56
Spatha_009	0.04	0.00	0.00	100.52	0.00	0.11	0.09	0.01	0.00	0.00	0.00	0.00	100.77
Spatha_0010	0.04	0.00	0.01	100.00	0.00	0.18	0.09	0.00	0.00	0.00	0.02	0.00	100.34
Spatha_0015	0.04	0.00	0.00	99.19	0.00	0.64	0.09	0.03	0.00	0.01	0.04	0.01	100.05
Spatha_0016	0.05	0.00	0.00	100.02	0.00	0.28	0.09	0.01	0.00	0.01	0.03	0.01	100.50
Spatha_0017	0.05	0.00	0.00	100.95	0.00	0.27	0.08	0.02	0.03	0.02	0.00	0.00	101.42
Spatha_0018	0.05	0.00	0.00	99.63	0.00	0.61	0.10	0.01	0.00	0.00	0.00	0.00	100.40
Spatha_0019	0.05	0.00	0.00	101.41	0.00	0.14	0.10	0.00	0.00	0.00	0.01	0.01	101.72
Spatha_0020	0.05	0.00	0.00	99.31	0.00	0.36	0.10	0.02	0.00	0.02	0.01	0.00	99.87
Spatha_0021	0.06	0.00	0.00	100.55	0.00	0.22	0.09	0.01	0.00	0.00	0.00	0.01	100.94
Spatha_0022	0.06	0.00	0.00	100.60	0.00	0.44	0.09	0.02	0.02	0.02	0.01	0.00	101.26
Spatha_0023	0.06	0.00	0.00	99.86	0.00	0.37	0.09	0.01	0.05	0.02	0.10	0.00	100.56
Spatha_0024	0.06	0.00	0.00	99.29	0.00	0.80	0.11	0.01	0.02	0.00	0.08	0.00	100.37
Spatha_0025	0.05	0.00	0.01	99.80	0.00	0.82	0.09	0.02	0.03	0.01	0.00	0.00	100.83
Spatha_0026	0.05	0.00	0.00	99.45	0.00	0.78	0.11	0.03	0.00	0.02	0.03	0.00	100.47
Spatha_0027	0.05	0.00	0.01	99.44	0.00	0.75	0.10	0.03	0.00	0.00	0.02	0.00	100.40
Spatha_0028	0.05	0.00	0.00	100.27	0.00	0.77	0.11	0.02	0.01	0.00	0.04	0.01	101.28
Spatha_0029	0.09	0.00	0.00	100.94	0.00	0.09	0.09	0.01	0.00	0.01	0.01	0.00	101.24
Spatha_0030	0.08	0.00	0.00	98.94	0.01	0.09	0.10	0.01	0.00	0.00	0.06	0.00	99.29
Spatha_0031	0.09	0.00	0.00	101.27	0.00	0.10	0.09	0.00	0.03	0.00	0.08	0.00	101.66
Spatha_0032	0.06	0.00	0.00	100.27	0.00	0.34	0.10	0.02	0.01	0.01	0.11	0.01	100.93
Spatha_0033	0.07	0.00	0.00	100.05	0.00	0.72	0.10	0.03	0.02	0.00	0.08	0.01	101.08
Spatha_0034	0.06	0.00	0.00	100.32	0.00	0.74	0.10	0.03	0.00	0.00	0.00	0.01	101.26
Spatha_0035	1.80	0.00	0.00	98.56	0.00	0.08	0.09	0.01	0.00	0.01	0.04	0.00	100.59
Spatha_0036	0.07	0.00	0.00	98.83	0.00	0.06	0.09	0.01	0.00	0.02	0.01	0.01	99.10
Spatha_0037	0.19	0.00	0.00	99.46	0.00	0.07	0.10	0.01	0.01	0.00	0.04	0.00	99.88
Spatha_0038	0.01	0.00	0.00	99.58	0.00	0.08	0.11	0.01	0.00	0.00	0.08	0.01	99.88
Spatha_0039	0.02	0.00	0.00	99.59	0.00	0.08	0.09	0.01	0.00	0.00	0.03	0.00	99.82
Spatha_0040	0.64	0.00	0.00	98.70	0.00	0.02	0.10	0.06	0.00	0.01	0.20	0.01	99.74
Spatha_0041	0.41	0.00	0.00	99.85	0.00	0.01	0.09	0.01	0.02	0.02	0.02	0.00	100.43
Spatha_0042	0.01	0.00	0.00	100.43	0.00	0.01	0.09	0.00	0.00	0.01	0.04	0.00	100.59
Spatha_0043	0.01	0.00	0.00	99.92	0.00	0.01	0.09	0.01	0.01	0.01	0.05	0.01	100.12
Spatha_0044	0.01	0.00	0.00	100.88	0.00	0.01	0.08	0.00	0.03	0.00	0.00	0.00	101.01
Spatha_0045	0.02	0.00	0.00	100.14	0.00	0.00	0.10	0.02	0.03	0.01	0.00	0.00	100.32
Spatha_0046	0.47	0.00	0.00	98.80	0.00	0.04	0.09	0.01	0.01	0.00	0.05	0.01	99.48
Spatha_0047	0.50	0.00	0.00	98.53	0.00	0.04	0.10	0.05	0.00	0.01	0.19	0.00	99.42
Spatha_0048	0.94	0.00	0.01	97.58	0.00	0.11	0.10	0.02	0.00	0.00	0.06	0.00	98.82
Spatha_0049	0.01	0.00	0.00	99.60	0.00	0.05	0.10	0.01	0.00	0.00	0.08	0.00	99.85
Spatha_0050	0.01	0.00	0.00	99.26	0.00	0.03	0.11	0.03	0.00	0.02	0.17	0.00	99.63

phosphorus is generally unwanted as it is known to cause cold brittleness.²⁵ On the other hand, no negative effects can be observed in pure ferritic iron, at least up to a content of 0.7%.²⁶ Phosphorus also increases the toughness and the weldability of the metal: besides this, the material becomes notably harder, although further heat treatment has no effect.²⁷ The cutting edges, on the other hand, were formed out of steel which could be further hardened. Thus, heat treatment would have been effective, but no signs of such a procedure were found.

THE RECONSTRUCTION PROCESS

The modern reconstruction of the Beckum blade was produced in the Seelenschmiede near Wolfenbüttel by Stefan Roth, Claus Lipka and Darius Roth. Since the replica had to be as true to the original as possible, certain conditions had to be met as the blade was to possess the measurements and all constructional details of the original. For example, the right alloys had to be used as much as possible. Furthermore, the metal was to be produced in a bloomery furnace and modern technologies applied as little as possible. Because the focus was foremost on the blade and the welding patterns there was no need to construct a scabbard. Since the archaeological sword showed only a few traces of the grip, a bog find from Nydam was chosen as a model for the reconstruction (fig. 8). Although this piece was deposited around a hundred years earlier than the weapon from Beckum, gold-hilted spathas and grip constructions of ringswords²⁸ suggest that both the curves of the handle and the shape of the guard were very similar to what was in use at the time of the Beckum sword.

PRODUCING THE METAL

At first the ore had to be smelted in a bloomery furnace.²⁹ The different metal elements present in the sword were analysed via mobile X-ray fluorescence analysis.³⁰ Steel and pure iron for the composite rods, which contained only traces of phosphorus, were relatively easy to achieve. In want of metallographic examinations, the carbon content of the material for the cutting edges was approximately determined by flying sparks and comparison of practical hardness tests in the forge. The fabrication of phosphoric material, on the other hand, took several attempts. Eventually, roasted ore with a content of about 0.35% phosphorus was

²⁵ Bauermeister and Kronz, 'Phosphorreiche Erze', p. 55.

²⁶ Godfrey, *Technology Phosphoric Iron*, p. 40.

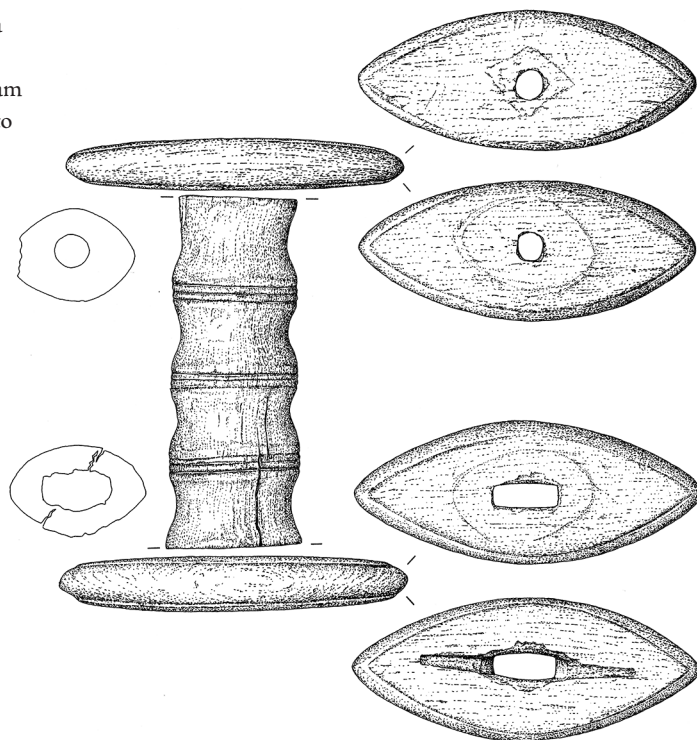
²⁷ Godfrey, *Technology Phosphoric Iron*, p. 37; Bauermeister and Kronz, 'Phosphorreiche Erze', p. 56; Schulz, 'Metallkundliche Untersuchung', p. 64.

²⁸ Lehmann, *Konstruktion, Herstellung und Wertigkeit*, pp. 113–20; Quast, *Grabfunde aus Gültlingen*, pls. 21.1, 24.2.

²⁹ Pleiner, *European Bloomery Smelters*.

³⁰ Calvo del Castillo and Strivay, 'X-Ray Methods', pp. 70–80.

FIG. 8: Grip construction of a double-edged sword made of horn from a bog find in Nydam of the migration period, not to scale.



used. Bone ash was added during the smelting process. In the end the bloom contained between 0.72% and 0.97% phosphorus, and only a few traces of all other elements but iron. Although the result was reproducible, it seems more likely that ore containing the desired amount of phosphorus was chosen in the early Middle Ages. On the other hand, burnt bones encompassed by slag are known from Joldelund: a find which indicates at least the occasional addition of bone ash to a smelt in order to produce phosphoric iron.³¹ As the smelting process itself was not part of the archaeological experiment, no detailed data like measurements of temperature and the time of adding fuel and ore was taken. All metal was produced in furnaces of mud brick and clay with a height of about 1m and a diameter of up to 0.5m (fig. 9). On two sides at the bottom air was blown in by electric fans. Charcoal made from beechwood was used as fuel. One full smelting process took about ten hours. Depending on the processed ore, the ore to fuel ratio varied and was at best approximately 1:2. All in all, material from five smeltings was used: one bloom of steel for the cutting edges (5.1kg), two blooms of plain iron (3.9kg and 2.7kg) and two blooms of a phosphoric material (4.4kg and 2.4kg).

The blooms were forged, cut to thin plates and welded together again a few times (figs 10 and 11). Then the massive block of metal was hammered out and folded over and over (fig.

³¹ Jöns, *Eisengewinnung Joldelund*, p. 111.



(Clockwise, from above)

FIG. 9: Bloomery made of clay.

FIG. 10: Forging of the bloom.

FIG. 11: Welding package made of forged pieces of the iron bloom.

FIG. 12: Repeated forging and folding of the metal.

12). In the course of this process slag inclusions and other impurities were reduced and the material became much more homogenous.

FORGING THE COMPOSITE RODS

The next step was to produce the composite rods. While planning the structure of the welding packages it became obvious that the aforementioned circular fillings of the curving patterns shown in the CT scans (fig. 13) could never be accomplished by an ordinary working

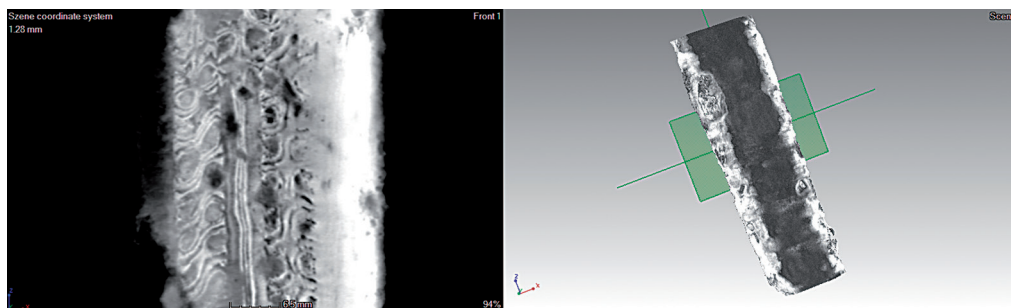


FIG. 13: In the CT scans of the frontal section, the circular fillings in the curving patterns of the Beckum blade become obvious.

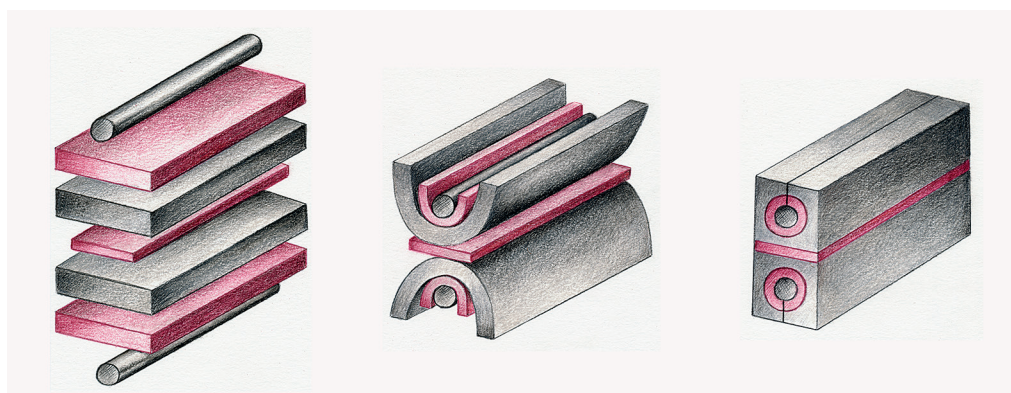


FIG. 14: Structure of the welding package that was used to produce the composite rods.

technique like stacking simple metal plates, as suggested by Jaap Ypey.³² Arcs, or at best semicircles, can be seen as fillings of the curving patterns in the twisted areas of the rods (fig. 2 [right side]). It is possible that Leo Biek and John Anstee, who performed their forging experiments in the middle of the twentieth century, were already aware of this problem as they used rods with a circular cross-section in their welding packages.³³ After several attempts it became clear that such elements were crucial in order to achieve the patterns of the original blade. At last, a much more complex structure for the welding packages was found (fig. 14). Two bars with a circular cross-section had to be surrounded by two layers of phosphorous and ferritic iron. Both packages were then welded to another strip of phosphoric metal. Owing to positive experiences in the past, borax was used as a flux. However, fine-grained sand should have worked as well. The structure of the composite rods described resulted in a much larger amount of effort, fuel and iron required of the smith than would have been by simply welding regular plates. It is very important to note that, as the examination of the finds from Westphalia hints, most early medieval blades and all of the weapons with a high

³² Ypey, 'Damaszierung', pp. 208–9.

³³ Anstee and Biek, 'Pattern-Welding', pp. 72–84.

manufacturing quality possessed similar patterns, and hence a more elaborate structure of the welding packages.

Already at this rather early stage it became clear that enormous amounts of burn-off would be produced when the metal was hammered. Consequently, after welding the different components, the packages were forged to rods with an edge length of the cross-section, 150% larger than the desired final measurements. Further elongation in the course of the following manufacturing process was also taken into account.

TWISTING AND WELDING THE COMPOSITE RODS

Before twisting could commence, thorough planning was required: all of the rods were to be rotated five times around their own axis in seven areas, each 40mm long, with all sections being twisted in the same direction. Further elongation in later steps was planned to result in a final section-length of 50mm. These segments were to be divided by straight sections of the same length. For this step the rods were heated in the forge and rotated with the use of ordinary blacksmith tongs (fig. 15). The addition of water could help to control the twisted areas. Any moment of inattention during the process might lead to breaking the metal. As



FIG. 15: A twisted composite rod.

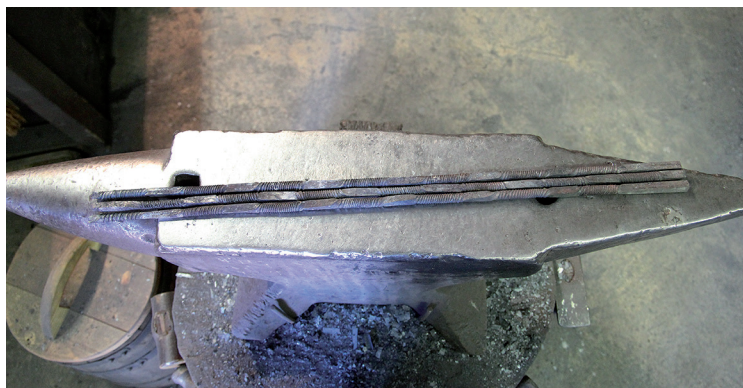


FIG. 16: The twisting of three composite rods in twenty-one areas altogether turned out to be a full day's work.

FIG. 17: The eight composite rods were welded in two layers to form the middle part of the blade.



FIG. 18: Adding the cutting edges.



FIG. 19: Shaping the tang.

such, errors could hardly be corrected and would inevitably show on the blade's surface. This procedure would take complete concentration by the smith and his assistant (fig. 16).

After successfully twisting the composite rods they were stacked in two layers and fastened with iron clamps. This package was then welded in the forge to form the core of the blade (fig. 17). Both ends of the composite rods remained untwisted. Next, the cutting edges were added on either side of the core and roughly shaped (fig. 18). No further heat treatment was performed, although this would have been effective. As the last part of the forging process the tang was formed (fig. 19). It consists mainly of the material that was used for the cutting edges.

GRINDING AND HILTING THE BLADE

Another labour-intensive step was the grinding and polishing. At first files and an embedded grindstone were used (fig. 20). After that, a number of bound abrasives with a grit of up



FIG. 20: Grinding of the blade with an embedded grindstone.

to 16,000 and unbound abrasives were deployed. Occasionally an electric belt sander was applied. By this process were the shape of the blade and the final layer of the welded patterns finally revealed. Due to the burn-off during the whole process there was far less material to be removed than expected. The patterns were not etched in any way. Nevertheless, the surface decoration clearly came to light.

Lastly, the guards and the handle were built after the above-mentioned model from Nydam. All parts are made from ash wood, which has been documented as hilt material on a find from Marktoberdorf.³⁴ The three components were mounted on the tang and, finally, the reconstruction was ready for exhibition (figs 21 and 22).

SUMMARY AND OUTLOOK

The whole manufacturing process made it clear that the required resources to produce an early medieval pattern-welded sword are immense. More than 16kg of smelted metal were used to forge a blade that in the end weighed only about 1100g. The rest of the material became burn-off. Nothing less than approximately 600kg of charcoal were needed for smelting and forging, additional tests not included. Altogether the different parts of the blade had to be heated more than a thousand times, at least five hundred heatings were required solely for the twisting of the rods. For the whole manufacturing process around 210 man-hours had to be invested by the smith and his assistants.

Comparing this replication with what can be assumed for the early medieval manufacturing process, certain differences that distort the assessment of labour input have to be stated, such as the use of a mechanical hammer to save time, especially when forging the bloom and the composite rods. Then again, the early medieval weapon smiths were far more

³⁴ Hopf, 'Hölzer Schwertscheiden', p. 103; Lehmann, *Konstruktion, Herstellung und Wertigkeit*, pp. 187–91.

FIG. 21: Finished reconstruction
of the Beckum blade.



FIG. 22: Detail of the polished welding patterns.



experienced in the production of pattern-welded swords and would thus have been able to perform at least some of the working steps in less time than their modern equivalents. This experience also becomes visible when looking at the almost impeccable welding patterns of the archaeological find. Unsurprisingly then, more practice is required to reach the level of craftsmanship present in early medieval Europe. Despite these aspects, however, it becomes clear that the making of such an elaborate pattern-welded sword was a very demanding process. Even if the burn-off may have been reused in some way, large amounts of resources were devoured and only the most skilled craftsmen were able to accomplish this task. One can hardly wonder that these objects were not only viewed as weapons, but also as important status symbols, and even as magical items.

In the future, forging replicas as true as possible to the originals, in both structure and material, will be essential to further investigate the manufacturing process of the early medieval *spatha*. They are also vital for the gathering of important information about the material properties of these weapons, which until the present day have remained mostly unknown to us. The more holistic approaches of archaeological research, scientific examinations and crafting experiments will undoubtedly be of great help in understanding the various far-reaching aspects of the pattern-welded sword.

ACKNOWLEDGEMENTS

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The replica of the Beckum sword was exhibited in the Archäologische Landesausstellung Nordrhein-Westfalens in Detmold and Herne (2016–2017). After that, the weapon will be presented in the Stadtmuseum Beckum. A filmed documentation of the manufacturing process is free to view on the website of the Altertumskommission für Westfalen (www.altertumskommission.de).

Material and Properties of VLFBERHT Swords

Ingo Petri

THE MATERIAL OF VLFBERHT sword blades has long been the subject of research. Based on metallographic analyses of fifty-six sword blades, Alan Williams has published the theory that they were originally made from crucible steel imported from Asia. This is mainly based on a high carbon and low slag content in his samples. The author of the article at hand examined seventeen sword blades, three of which have been treated by Williams. Surface structures, verified in four cases by X-ray images and CT scans, clearly show that all of these swords have been made from a layered raw material typical of European iron and steel production. As further analysed objects show that Europeans were able to produce steel with a high carbon and a low slag content, the origin of the raw material for the VLFBERHT sword blades most likely lies in Europe.

As a result of the television documentary *Secrets of the Viking Sword* (produced by Nova in 2012), VLFBERHT swords, and especially the material of their blades, have received popular recognition over recent years. The hypothesis presented in the documentary is that the early specimens of these weapons are of a high quality due to the use of crucible steel that had allegedly been imported from the East by Scandinavian merchants, and that they had been manufactured in Scandinavia. This is mainly based on four publications by Alan Williams,¹ who presented metallographic analyses of fifty-six sword blades from the early medieval period, mostly conducted by himself. Most of these sword blades are inscribed with the name VLFBERHT.

One of the swords that Williams reckons to be made from crucible steel is from the collection of the Museum für Hamburgische Geschichte / Hamburg Museum (Museum für Hamburgische Geschichte / Hamburg-Museum, 1965:124). From 2014 to 2015 it was presented in the exhibition *Mythos Hammaburg* at the Archäologisches Museum Hamburg. Since the author of the article at hand was curator of that exhibition, he was approached by numerous visitors about the supposedly exotic material of this sword, especially since Williams' theory had not been mentioned in the exhibition texts.

¹ Williams, *Sword and Crucible*; 'Metallurgical Study'; 'Crucible Steel'; Edge and Williams, 'Early Medieval Swords'. As the first mentioned is the more recent and more extensive one, further references will be made exclusively to this title.

The Museum für Hamburgische Geschichte kindly gave permission to examine this sword in detail. Furthermore, the author had the opportunity to examine in detail twelve more early and high medieval swords from the collections of the Archäologisches Museum Hamburg, the Museum für Hamburgische Geschichte / Hamburg Museum, the Museum für Vor- und Frühgeschichte, Staatliche Museen zu Berlin and the Schwedenspeicher-Museum Stade.² Further information about some swords could be gathered from literature and museum exhibitions. The results of these analyses concerning the material of the sword blades will be presented in this article and compared to the theory published by Williams.

METHODS

The usual method for analysing material and methods for manufacturing a sword blade would be metallography. For this purpose a sample, ideally a whole cross section, is cut out. It is then polished and etched with different chemicals. By this method the carbon distribution, slags and the microstructure are made visible. Hardness measurements are also taken; in metallography generally the Vickers hardness (HV) is used.³ This method is destructive and thus is mostly not allowed by museums, especially on well-preserved or special objects.⁴ To limit destruction, sometimes only the taking of half sections or even smaller samples is allowed. Therefore, out of fifty-six analyses of early medieval swords, Williams took only four full and five half sections of blades. The smaller the sample, however, the more limited the information about the composition of the sampled object. This is crucial, as most medieval sword blades are far from homogenous, as Williams himself states.⁵ It could be added that taking only one cross section also provides us with limited information about a whole blade.

A method to determine the macrostructure of more corroded blades has been applied by Westphal.⁶ After removing the corrosion he was able to observe the macrostructure of two seax blades on the surface of the preserved metal. This is due to the fact that different kinds of material are differently attacked by corrosion. Furthermore, material faults like imperfect forge welds are more easily attacked by corrosion because they offer the possibility for the corrosion to penetrate the object, thus making them more visible.⁷

Non-destructive methods are (stereo-)radiography and (micro) computed tomography. They provide information about the structure of the blade, albeit without giving details

² The author would like to thank the staff of these museums for the possibility to examine the swords. Further thanks go to the staff of the chair for material science of the Christian-Albrechts University Kiel for countless help with technical questions.

³ Föll, *Iron* (a), chapters 3.3.2., 7.1.1.

⁴ Cf. Williams, *Sword and Crucible*, p. 49.

⁵ Williams, *Sword and Crucible*, pp. 49–50; cf. also p. 130, where the two samples from the edge differ from each other; cf. also Mäder, *Stäble, Steine und Schlangen*, p. 14.

⁶ Westphal, 'Schweißtechniken'.

⁷ Cf. Föll, *Iron* (a), ch. 6.2.3. This can be seen in Williams, *Sword and Crucible*, p. 157 fig. 61, p. 168 fig. 78, and p. 255 fig. 43.

about the material such as its hardness or material composition. In general, they show different densities of the material. Since the differences in density between iron and various kinds of steel are insignificant (and mainly the result of material faults), non-destructive methods display only different material thicknesses due to the different levels of corrosion, and different densities due to corrosion products when applied to the VLFBERHT swords.⁸

The best results would be achieved by a combination of these methods.

The author of this article was not allowed to apply destructive methods. With most of the swords only a visual examination of surface patterns was possible. On four of the swords it was possible to do X-ray imaging as well as micro computed tomography.

REQUIREMENTS FOR A GOOD SWORD

Generally, hardness is taken as a criterion for rating the material quality of a sword blade: the harder, the better. But what does hardness mean? To oversimplify, more force is needed to permanently deform a hard material, but it breaks more readily than a soft one: it is brittle. A soft material is more easily permanently deformed but harder to break: it is tough or ductile. The hard sword blade thus has the advantage of regaining its shape after striking or being struck, where a soft one would stay bent. Conversely, a soft one has the advantage of becoming permanently bent where a hard one would break. What is true for the whole blade also applies to the cutting edge. When a hard cutting edge hits an obstacle such as a shield, armour or another weapon, it is more resistant to becoming notched or otherwise permanently deformed (blunted) than a soft one, but will more easily chip or break.⁹ When searching for the right material for a sword blade, a compromise is thus required.¹⁰

As the blades of early medieval swords are quite thin (< 6mm) they are not very rigid and thus would easily give way on impact. There are numerous historical sources for blades breaking while being used, and modern sources support this too.¹¹ A broken sword is of little use to its wielder, whereas a bent one can still be used and eventually straightened.¹² One possibility to counteract bending and breaking would be a thicker and thus more rigid blade, but this would also result in a heavier sword and a greater resistance when cutting through a target. Thus, the better solution is to use a tough, ductile material. A sword that is a little bit too soft is probably better than one which is too hard. Another possibility is to be found in combining hard and tough materials, which will be covered in more detail in the passage “production of swords”.

This article is exclusively about the material properties of sword blades, so questions of blade and hilt shape will not be discussed. The difference in rigidity (resistance to

⁸ Lang and Ager, ‘Swords’, pp. 88–89.

⁹ Föll, *Iron* (a), ch. 3.1.3, 3.1.4, 3.3.1, 3.3.3, 5.4.2.

¹⁰ Williams, *Sword and Crucible*, pp. 11–230; Mäder, *Stähle, Steine und Schlangen*, p. 15.

¹¹ E.g. Wilson, *Bayeux*, figs 64, 65, and 73; Kinsley, *Sword Fighters*.

¹² Cf. Williams, *Sword and Crucible*, pp. 11, 18, 53.

non-permanent, elastic deformation) between iron and different carbon steels is negligible: a material's rigidity is solely caused by the bonding energy of its atoms. The influence of a few per cent of carbon atoms in these steels is insignificant and heat treatment does not have any influence at all. In consequence, a blade's rigidity does not depend on its material but almost exclusively on its thickness and cross-section.¹³

PROPERTIES AND PRODUCTION OF RAW MATERIAL

The swords discussed in this article were produced from iron and/or steel. At first, the different types of iron and steel will be characterised, and then their production method will be explained.

Pure iron is a relatively soft (80–90 HV) but tough, ductile metal with a melting point of 1,538°C.¹⁴ It cannot be hardened by quenching, and only slightly by work-hardening.

To oversimplify, iron that contains up to 2% of carbon is called steel.¹⁵ There are different systems to differentiate between iron and different categories of steel,¹⁶ but all these categories are artificial. For the manufacturing of swords, it is important that the hardness of steel rises with its carbon content, and that steel can be hardened further by quenching it in water or other cooling agents. Rising hardness is of course connected to rising brittleness.¹⁷ The melting point of steel slightly decreases with increasing carbon content but is still very high (for example 1,457°C for steel with 1.3% carbon). Therefore, steel has only been cast since the mid-nineteenth century; before then it had to be shaped by forging. Steel with less than 0.7–0.8% carbon is called hypoeutectoid, with 0.7–0.8% carbon it is called eutectoid and with more than 0.7–0.8% carbon hypereutectoid. In eutectoid steel, the iron crystals are saturated with carbon. In hypereutectoid steel not all of the carbon can be absorbed by the iron crystals, and as a result part of it separates as free cementite (a chemical compound of iron and carbon); this separation can result in the formation of needles within the material grains, as a layer around them, or as small globules between them.¹⁸ As cementite is very hard but very brittle, the first two cases render the whole material extremely brittle.¹⁹

When the carbon content is between 2% and 4% the material is called cast iron. Cast iron is very hard but very brittle; the melting point drops to 1,150°C for an alloy containing 4% carbon. Cast iron cannot be forged, it is cast into shape.²⁰

¹³ Föll, *Iron* (a), ch. 3.1.2, 3.3.3, 4.1.3; *Iron* (b), ch. 12.1.1; Petri, 'Steifigkeit'.

¹⁴ Williams, *Sword and Crucible*, pp. 5, 11, 188; Föll, *Iron* (a), ch. 2.3.1, 3.3.2.

¹⁵ Föll, *Iron* (a), ch. 2.2.1, 2.3.1, 2.3.2, 3.3.2, 6.1.2, 7.1.1, 7.2.1, 7.2.2, 8.2.1, 8.2.2.

¹⁶ Pleiner, *European Blacksmiths*, pp. 18–22; Williams, *Sword and Crucible*, p. 49.

¹⁷ Williams, *Sword and Crucible*, pp. 18–19, 21–22, 15 fig. 1.

¹⁸ *Ibid.*, pp. 20, 23.

¹⁹ Cf. *Ibid.*, p. 189.

²⁰ Williams, *Sword and Crucible*, pp. 38, 113, 188; Föll, *Iron* (a), ch. 2.3.1.

From the Iron Age to the early Middle Ages, iron in Europe was exclusively produced in bloomery furnaces.²¹ They stayed in use until the beginning of the nineteenth century, being used alongside later furnace types.²² Different types of bloomery furnaces were in use at different times and regions. What is important here is that bloomery furnaces were relatively small, with heights of about 1–2m.²³ Therefore, the attainable temperature was not high enough to melt the largest part of the iron. The iron ore was reduced during its passage through the furnace and did not have enough time to absorb large amounts of carbon from the fuel. The impurities from the ore then formed a molten slag which either trickled down into the slag pit at the bottom of the furnace, or was tapped at the front of the furnace. The iron which accumulated at the bottom of the furnace formed a bloom, which is an inhomogeneous and spongy iron lump containing cavities, slag inclusions and slag adherent to its surface. The carbon content of a bloom was very inhomogeneous; it contained areas of medium and even high carbon contents, some small parts of it even being of cast iron, while the greater part was almost carbon-free iron.²⁴

Pleiner demonstrated in an experiment that it was possible to manipulate the bloom in a certain way during the smelting process, resulting in it having a better separation from the slag and a higher carbon content. The product was a hard, homogeneous carbon steel of nearly eutectoid composition. He assumes that there were individual groups of ironmakers who understood how to make such steeled blooms.²⁵

Once the smelting process was complete, the bloom was extracted from the furnace and heated and hammered both to remove remaining impurities and to consolidate it. To further clean and homogenise the material, it had to be drawn out, folded and forge welded several times. During this process, some of the slag was squeezed out at the edges and the remaining slag was broken up into smaller pieces. There was also the possibility to break the bloom into pieces and to separate the different material qualities according to their hardness, colour and/or structure in a manner similar to the techniques of Japanese blade smiths. The sorted small pieces of similar material quality were then assembled in a faggot or pile and forge welded to create a larger ingot. This is not pattern welding or Damascus steel.²⁶

²¹ A very good overview of this production method is given by Pleiner, *European Bloomery Smelters*. There are numerous further regional and chronological case studies: Jöns, 'Eisenverhüttung'; Engel, *Abbau und Verhüttung*; Petri, 'Metal Production'; Buchwald, *Iron*.

²² Krünitz, *Enzyklopädie* 10, pp. 579–85; 604–5; Espelund, 'Rennofenanlagen', pp. 181–83, fig. 2; Buchwald, *Iron*, pp. 40–43, 68, 173–75, 179–82, and figs 35–37, 60; Pleiner, *European Bloomery Smelters*, pp. 137–39, 284–86.

²³ Jockenhövel, 'Hochofen', p. 84.

²⁴ Pleiner, *European Bloomery Smelters*, pp. 230–50, fig. 66; Buchwald, *Iron*, p. 127, fig. 110; Williams, *Sword and Crucible*, p. 15.

²⁵ Pleiner, *European Bloomery Smelters*, pp. 137, 190–91; Cf. also Williams, *Sword and Crucible*, pp. 15, 24, 199.

²⁶ Pleiner, *European Bloomery Smelters*, pp. 215–16, 215–29; Buchwald, *Iron*, pp. 456–58; Mäder, *Stähle, Steine und Schlangen*, pp. 68, 93–107, 140–41, 150, 154–58, fig. 51; Williams, *Sword and Crucible*, pp. 16, 24, 42; Föll, *Iron* (a), ch. 3.2.3; *Iron* (c).

The purifying of the raw material to lower slag content is very important for the mechanical properties of the material. Williams showed that a reduction of the slag content has a much greater effect on the toughness of the material than increasing the carbon content.²⁷ As a consequence of this process, the raw material consisted of several more or less homogeneous layers, resulting in a layered “flaky pastry” – or fibrous structure – depending on how the folding was done. During folding and forge welding, there was of course the danger of bringing additional impurities and material faults into the material. As forge welding was quite commonly executed by blacksmiths up until the nineteenth century, one may be sure that they were masters of the process. This can also be attested by numerous metallographic sections where welding seams are often hardly visible.²⁸

From the high medieval period onwards, bloomery furnaces became larger in some areas of Europe.²⁹ The increase in size meant the process in the furnace changed. The passage of the reduced iron through the furnace took longer, enabling the iron to absorb more carbon. The temperatures inside the furnace also rose, leading to an even higher absorption of carbon and a better separation of the slag. The product of these bigger furnaces were blooms which contained more steel and less slag than those of the smaller bloomery furnaces. The higher absorption of carbon lowered the melting point of the material, which when combined with the higher temperatures inside the furnace eventually led to liquid cast iron. Such large bloomery furnaces, called *Stuck-* or *Stücköfen*, were in use in Styria (Austria) and Slovenia up to the beginning of the nineteenth century. In them, blooms weighing up to nearly two tonnes were produced. The blooms had differing carbon contents: high-carbon steel with up to 1.5% carbon on the inside, and iron on the outside. This inhomogeneous distribution was understood, and when splitting up the blooms the workers tried to separate up to five layers of different carbon contents. The material was then cleaned and homogenised as described above.

Cast iron producing furnaces may have existed on the Swabian Alb (Germany) as early as the mid-eleventh century. They seem to show a continuous development from the small early medieval bloomery furnaces to the bigger high medieval furnaces. Further enlargement led to the development of the *Floßöfen*, a precursor of the blast furnace.³⁰ These furnaces were in use in the Sauerland (Germany) and in Lapphyttan (Sweden) from the thirteenth century onwards, maybe even a century earlier. In them, liquid cast iron was produced.³¹

²⁷ Williams, *Knight*, pp. 931–32.

²⁸ Cf. Williams, *Sword and Crucible*, pp. 54, 235, 257, 258 fig. 49, p. 260 fig. 53, p. 278, and p. 279 fig. 92.

²⁹ Krünitz, *Enzyklopädie* 176, p. 544; Jockenhövel, ‘Hochöfen’, p. 84; Buchwald, *Iron*, pp. 188–94; Pleiner, *European Bloomery Smelters*, pp. 137–39, 187–88; Williams, *Knight*, p. 933; *Sword and Crucible*, pp. 206–8; Köstler, ‘Übergang’, pp. 28–31; Zeitlinger, ‘Sensen’, pp. 81–85.

³⁰ Kempa, ‘Archäologische Untersuchungen’, p. 49–90; Yalçın and Hauptmann, ‘Archäometallurgie’; Jockenhövel, ‘Hochöfen’, pp. 83–98; Knau and Sönneken, ‘Eisenverhüttung’, pp. 222–29; Krünitz, *Enzyklopädie* 10, pp. 582, 588–608, 614–20, fig. 562; Köstler, ‘Übergang’, p. 28–31; Buchwald, *Iron*, pp. 226–23; Pleiner, *European Bloomery Smelters*, pp. 82–85, 283–84; Williams, *Sword and Crucible*, pp. 38, 94, 189, 191, 202.

³¹ Buchwald, *Iron*, pp. 226–27, 236–37; Williams, *Sword and Crucible*, pp. 113, 195–96, 198.

The oldest objects directly cast from cast iron in Central Europe may be dated to the fourteenth century.³² Before this, cast iron was fined to steel or pure iron. In the fining process, the metal was made molten again and the carbon content lowered by burning it. As the carbon content fell, the melting point rose and lumps of solidified material began to form, which were collected in a bloom. The original cast iron was slag free, but due to the fining process the resulting bloom contained small amounts of slag. This bloom had to be consolidated and homogenised by forging it in a similar manner to a bloomery furnace bloom.

With the exception of cast iron, all European iron or steel up to the invention of cast steel in the middle of the eighteenth century thus had a “flaky pastry” – or fibrous structure – resulting from cleaning and homogenising the raw material by folding and/or faggoting/piling. Furthermore, it contained impurities which tended to decrease during the development from the small early bloomery furnaces to the blast furnaces, while the homogeneity of the carbon content tended to rise. The outcome of both processes, however, depended greatly on the skill of the craftsmen involved in them.

Alan Williams introduced another kind of steel into the discussion about European swords. This is crucible steel.³³ Crucible steel has been known since the ninth century at the latest, and it has been produced in India, Persia and Central Asia. Two methods of production have been reported. Iron was heated either in closed crucibles together with carbon-containing material or with cast iron. Both lead to the iron absorbing enough carbon to completely melt. Thus, the metal completely separates from the slag and a homogeneous steel is achieved. Crucible steel was always a hypereutectoid steel (over 1.0% C and up to 1.8% C), as the temperatures for completely melting a steel of lower carbon content were not achievable.³⁴

PRODUCTION OF SWORDS

Regarding the requirements for a good sword in relation to the properties of the different raw materials presented in the previous sections, pure iron and cast iron can be excluded as a single material for the production of high-quality sword blades; they are respectively either too soft or too brittle. Both materials, however, have been used in their pure form for sword-making³⁵ – it must be borne in mind that not all swords were good swords.

The best sword blades would be made entirely out of steel.³⁶ But which steel would be the most suitable? Today one would preferably make a homogenous blade from a steel of hypoeutectoid or eutectoid composition, harden it by fully quenching and then temper it to reduce the brittleness. But the success of this operation depends on the precise knowledge of the composition of the steel, as well as on the precise control of temperatures and time. As a medieval smith most probably could not meet these requirements, for him it might

³² Jockenhövel, ‘Hochofen’, p. 93; Williams, *Sword and Crucible*, pp. 190–91.

³³ See note 1.

³⁴ Williams, *Sword and Crucible*, pp. 24–32; Egerton of Tatton, *Indian and Oriental*, pp. 58–59.

³⁵ Williams, *Sword and Crucible*, pp. 28; 39.

³⁶ *Ibid.*, p. 230.

have been a better option to take a steel with a higher carbon content and not to harden it.³⁷ If the chosen steel was hypereutectoid it would have been important to reduce the brittleness caused by cementite. This may either be done by annealing, causing the cementite to spheroidise, or by breaking up the cementite by forging.³⁸

Hence, crucible steel could be a good material for a sword blade if treated correctly. Crucible steel would also have the advantage of a low slag content. A sword from crucible steel would ideally be made of only one ingot. Tatton reports blades being made from two billets of crucible steel welded together.³⁹ This was most likely due to problems in producing billets large enough for a sword.

Crucible steel is not, however, the superior steel that Williams claims it to be.⁴⁰ Historical accounts attest a high brittleness to it.⁴¹ This is confirmed by a bending test on four Indo-Persian blades cited by Williams: "The samples [...] were of such hard steel that they broke without showing any plastic distortion".⁴² It should be added that the reported brittleness is not solely a problem of crucible steel, but of every high-carbon steel.

Another possibility for making a good sword blade would be a composite material from hard steel and soft steel, or even pure iron, where the hard steel forms the edges and the iron the body, thus combining hardness and toughness. This would enable the smith to harden the sword, since the brittleness of the hard edges could be counterbalanced by the soft body.⁴³ Williams argues that this method is not very useful, because bloomery iron contains too large an amount of slag, thus being not tough but brittle. Rather, he thinks that this method was applied to save precious steel.⁴⁴ Yet high amounts of slag in the iron are not exclusively a question of the raw material used; by effectively sorting and cleaning the raw material, the amount and size of slag inclusions can be reduced considerably.⁴⁵ Williams actually gives another option himself by mentioning how Japanese swordsmiths used iron which had been produced by decarburising steel of a lower slag content for the cores of their blades.⁴⁶ Besides, wrought or bloomery iron does not seem to be too bad a material, as Williams himself states that "wrought iron remained a favoured material of civil engineers until late in the nineteenth century on account of its 'toughness' (defined in this case as resistance to sudden shocks)".⁴⁷ Such sudden shocks are to be expected in the use of a sword blade. Furthermore, he gives the results of tensile testing carried out on the material of six *franciscas* (from the fifth to the sixth century) which probably were of a very low carbon content. The material shows a very

³⁷ Cf. *Ibid.*, pp. 18–19, 21, 50, 58–59.

³⁸ Williams, *Sword and Crucible*, pp. 23, 37; Föll, *Iron* (a), ch. 7.2.2, 8.2.1, 8.2.2.

³⁹ Egerton of Tatton, *Indian and Oriental*, p. 58.

⁴⁰ Williams, *Sword and Crucible*, pp. 25, 36.

⁴¹ Egerton of Tatton, *Indian and Oriental*, pp. 56–57; Buchwald, *Iron*, p. 475.

⁴² Williams, *Sword and Crucible*, pp. 81–82.

⁴³ *Ibid.*, pp. 36, 53.

⁴⁴ *Ibid.*, pp. 65, 202.

⁴⁵ Cf. *ibid.*, p. 74.

⁴⁶ *Ibid.*, p. 42.

⁴⁷ *Ibid.*, p. 13.

high ductility – higher than that of modern low-carbon steels – thus not being brittle but very tough.⁴⁸

There are different options for constructing such a composite sword blade. The blade could simply be made from iron or soft steel, and then be carburised by heating it for several hours whilst keeping it in contact with carbon. As the absorption of carbon in the solid state is very slow, however, only a very thin surface layer would be carburised (that would be eventually used up after grinding the edge several times). By trying to produce a thicker layer, the outer surface and especially the thin edges would absorb too much carbon and thus become very brittle.⁴⁹

A better option would be to take hard steel and iron directly from the smelting furnace and forge-weld it together. This might be done in different ways, for example by welding steel edges to an iron body, by sandwiching a layer of steel between two layers of iron, or by wrapping a layer of steel around an iron core.⁵⁰ The most complicated form of this production method is known as pattern welding, adding a decorative effect to the functional aspect. The numerous forge welds necessary, especially for the latter method, have often been considered a problem because they potentially introduced impurities and faults into the material, but since the raw material was already folded and forge welded several times this was a normal procedure even for swords made “from a single piece of steel”, at least for European steel.

All of these methods have their advantages and their disadvantages. Which one is chosen depends on several factors such as, for example, the cost. While for an expensive sword for a wealthy customer the best material and complicated production techniques could be chosen,⁵¹ other swords were made in a simpler manner from cheap materials. Other factors were the availability of raw material and the skill of the craftsman. Furthermore, fashion may have played a role, as the techniques show a chronological development from piled blades over pattern welded blades to all-steel blades.⁵²

OBSERVATIONS ABOUT THE PRODUCTION METHOD AND RAW MATERIAL OF THE SWORDS

As can be seen throughout the list at the end of this chapter providing descriptions of the swords consulted, all swords, including all VLFBERHT swords the author was able to examine, show welding seams on the surface of the blade. Their visibility differs a lot depending on the state of preservation, the applied method of conservation and last but not least on the quality of the forge welding. Generally, the most corroded blades and especially those that have been electrolytically cleaned in the past show the clearest structures. On other swords, these structures are not so obvious and not always visible in all places, but

⁴⁸ Ibid., pp. 80–81.

⁴⁹ Ibid., pp. 16–17, 230.

⁵⁰ Ibid., pp. 16–17, 121, 230.

⁵¹ Ibid., p. 202.

⁵² Ibid., pp. 18, 36, 62, 73, 116.

enough so to show that all parts of the sword have been made from a material with a layered “flaky pastry” – or fibrous structure. On the four VLFBERHT swords from the Museum für Vor- und Frühgeschichte, Staatliche Museen zu Berlin it could be confirmed by X-ray images and micro computed tomographies that these surface structures are welding seams (figs 1–5).⁵³

Two of the swords listed at the end of this article were analysed by Williams⁵⁴ and found to be of hypereutectoid composition, with very few or no slag inclusions and no traces of forge welding. Due to these results they were classified in his group I, defined as “swords containing hypereutectoid steels”, together with a third sword⁵⁵ which had been analysed earlier and found also to be made of a hypereutectoid steel. Williams suggests their material to be an imported crucible steel.⁵⁶ Regarding the results presented in the article at hand, this suggestion has to be rejected.

As all swords examined by the author, including those analysed by Williams, show a layered structure, they were most likely made from traditional European steel that had been folded several times to homogenise the material and to remove the slag. Apparently, at least for the specimens analysed by Williams, that has been done very successfully. In the case of the three swords of hypereutectoid steel (at least in the small samples taken) the material most likely was produced in a large bloomery furnace/*Stückofen*. If they were forged from crucible steel, then they would have been made from one, or maybe two pieces either without or with just one welding seam.

How can these contradictory results be explained? As corrosion generally attacks poorly executed welding seams, what is preserved today are the homogenous or better-welded areas between them.⁵⁷ Taking only very small metallographic samples thus bears the danger of sampling only the homogenous areas, or those with properly executed welding seams. Williams’ analyses of these swords have most probably been carried out on very small samples; unfortunately, neither the size of the samples nor the exact location of sampling are given in his text. The depicted areas, however, are very small: that from Solingen (Deutsches Klingenmuseum Solingen, 1973.W.005) measures about $0.3 \times 0.37\text{mm}$ and the one from Hamburg (Museum für Hamburgische Geschichte / Hamburg-Museum, 1965:124) about $0.08 \times 0.08\text{mm}$. In the case of Hamburg (Museum für Hamburgische Geschichte / Hamburg-Museum, M 1152)⁵⁸ the sword has only been added to this group because of its hypereutectoid carbon content. As has been shown above in the section on the production

⁵³ The author thanks the staff of the *Bundesanstalt für Materialforschung und -prüfung* for the micro computed tomographic measurements.

⁵⁴ Hamburg (Museum für Hamburgische Geschichte / Hamburg-Museum, 1965:124): Williams, *Sword and Crucible*, pp. 125–26 figs 7–8; Solingen (Deutsches Klingenmuseum Solingen, 1973.W.005): *Ibid.*, p. 125 fig. 6.

⁵⁵ Hamburg Museum für Hamburgische Geschichte / Hamburg-Museum, M 1152: *Ibid.*, pp. 122–23 fig. 1.

⁵⁶ *Ibid.*, pp. 24, 120–21, 187.

⁵⁷ Cf. *ibid.*, pp. 157 fig. 61, p. 168 fig. 78, and p. 255 fig. 43.

⁵⁸ *Ibid.*, pp. 22–23 fig. 1.

of raw material, this does not necessarily need to be crucible steel, as hypereutectoid steels could also be produced in Europe. Williams himself gives several examples of steels of near-eutectoid, eutectoid or even hypereutectoid composition from earlier periods without assuming that they have been made from crucible steel.⁵⁹

Furthermore, the sword from Essen⁶⁰ was analysed earlier; it showed a carbon content of 1.1%, while the ore for the production originates from Lorraine (France)⁶¹ and the X-ray-images show clear welding seams.⁶²

The low amount of slag in the high-carbon steels analysed does also not necessarily point to a crucible steel, as the amount of entrapped slag depends upon the carbon content in bloomery steels also, a fact mentioned by Williams himself.⁶³ Hardly visible traces of welding seams or even their absence in metallographic sections have been stated for several swords analysed by Williams, although there are other indications for forge welding.⁶⁴ Evidently the forge welding had been carried out with high degrees of skill. This most probably also applies to the VLFBERHT swords under discussion. To assume European bloomery steel as the raw material for the high-carbon VLFBERHT blades would also explain the inhomogeneity found in many of these blades, without having to assume an imperfectly melted crucible steel as done by Williams.⁶⁵

Williams divides the swords into five groups due to the results of his metallographic analyses.⁶⁶ His definitions are given according to his list on p. 118 of *Sword and Crucible*, to his description of the groups, and according to the titles of the respective chapters, because they differ slightly.⁶⁷

⁵⁹ Williams, *Sword and Crucible*, p. 57: Roman knife, cutting edge with 1.30% C; pp. 68–69: Spathas from Vimose with up to 0.8 respectively 0.9% C; p. 75: Merovingian period sword, one strip of pattern-welding with 0.9% C; p. 77: Sword, ninth century, cutting edge with 0.6–0.7% C. Cf. also: Föll, Iron (a), chapter 11.4.3.

⁶⁰ Williams, *Sword and Crucible*, p. 233.

⁶¹ Pothmann, 'Einleitung', p. 3.

⁶² Westphal, 'Untersuchung', pp. 65 fig. 23, 68 fig. 26.

⁶³ Cf. Williams, *Sword and Crucible*, p. 199; furthermore pp. 77–79: a sword from the ninth century did not show slag inclusions in its pattern-welded centre.

⁶⁴ Williams, *Sword and Crucible*, pp. 54, 67, 149, 172, 173, 176, 181; cf. also Edge and Williams, 'Early Medieval Swords', p. 194, figs 5–6, where sword III.4 from a private collection (Williams, *Sword and Crucible*, pp. 143–44) is described in greater detail and it is stated that the welding line between core and outside layer is hardly visible. Here, a different spelling of the inscription is given.

⁶⁵ Williams, *Sword and Crucible*, pp. 25, 120, 134–35, 136.

⁶⁶ Ibid., pp. 117–22, 231.

⁶⁷ The assignment of the swords to these groups is sometimes inconsistent and hard to follow. Williams, *Sword and Crucible*, pp. 169–70 may serve as an example: only one small sample has been taken from sword IV.13 (Saaremaa K85-123), the location of sampling not being given. Nevertheless, it has been assigned to group IV ("unhardened steel edges on an iron core"). For an identification of blades belonging to this group, a half section or at least a sample from the edge and one from the core would be necessary. Furthermore, the same sword is listed again on p. 280

Group I: "hypereutectoid steels" (p. 120: "made in part or in whole from steels which are much higher in carbon content", p. 122: "swords containing hypereutectoid steels")

Group II: "eutectoid steels" (p. 120: "made in part or in whole from steels which are much higher in carbon content", p. 135: "all-steel swords with eutectoid or hypoeutectoid blades")

Group III: "hardened steel edges on an iron core" (p. 140: "swords with hardened steel edges")

Group IV: "unhardened steel edges on an iron core" (p. 156: "swords with unhardened steel edges")

Group V: "iron blades" (p. 122: "swords made largely of iron or low carbon steels", p. 172: "swords made largely of iron")

Williams attests that the swords in his groups I and II were of the highest quality available at this time due to their high carbon and low slag content.⁶⁸ A closer look at the metallographic analyses published by him, however, shows that this cannot be confirmed. Five blades out of nine in group I⁶⁹ and one from group II⁷⁰ show cementite networks at the grain boundaries leading to a rather brittle blade, while one from group I⁷¹ has been "somewhat overheated in working", and thus is relatively soft.⁷² If the distribution of the average edge hardness in his groups is compared (fig. 6), one can clearly see that groups I–III slightly differ in hardness: group II is the softest, group I is slightly harder, and group III is the hardest. With this in mind, swords from group III might be the better ones due to the fact that they possess a hard edge whose brittleness is compensated by a soft core. Williams sees group III as a counterfeit of groups I and II and adds that the hard edge attained by this method would have been removed after some re-sharpening.⁷³ But this depends on the size of the welded-on steel edges. A hard edge measuring only a few millimetres might be enough. If this edge is removed by wear, the sword loses its usefulness anyway, due to the changed blade geometry. Furthermore, as the swords from groups I and II are not as good as stated, there was probably not much reason to counterfeit them.

Williams shows that special variants of the inscription are related to his groups. Group I and II mostly show the spelling +VLFBERH+T with the last cross between the letters H and T while group III mostly shows +VLFBERHT+, with the last cross behind the letter T.⁷⁴ As Stalsberg states, there is a clear tendency that sword blades showing the HT+

in group IV of the swords after 1000, even though in the text the dating "9th or 10th century" is given.

⁶⁸ Williams, *Sword and Crucible*, p. 120.

⁶⁹ Stuttgart WLM 1973-70: Williams, *Sword and Crucible*, pp. 123–24; Hamburg (Museum für Hamburgische Geschichte / Hamburg-Museum, 1965:124): Ibid., pp. 124, 125–26; Oslo c.4690: Ibid., pp. 127–29; Bergen 882: Ibid., pp. 130–31; Bergen 1483: Ibid., pp. 132.

⁷⁰ Bergen 3149: Ibid., pp. 135–36.

⁷¹ Solingen (Deutsches Klingenmuseum Solingen, 1973.W.005): Ibid., p. 125.

⁷² As partly stated on p. 120, *ibid.*

⁷³ Ibid., pp. 120–21.

⁷⁴ Unfortunately, for twenty swords there are differences between the spelling of the inscription given in the list in Williams, *Sword and Crucible*, pp. 118–19 and in the respective text or only one

variant of spelling are slightly older than the blades showing the H+T variant of spelling.⁷⁵ This is also supported by the more sensible writing of the name. Therefore, it seems that the swords from group III are the originals.

Due to the distribution of the VLFBERHT swords in Europe, with the largest concentration around the Baltic Sea and especially in Scandinavia, Williams locates the manufacture of these blades in Scandinavia.⁷⁶ As most of the swords are from graves, this distribution should rather be explained by the burial customs: in the Christian Frankish/German Empire, graves from the end of the eighth century onwards were not equipped with grave goods, whereas in the Baltic region grave goods were given up until the eleventh century.⁷⁷

Furthermore, the inscription itself speaks against a Scandinavian origin for these blades. The shape of the letters is characteristic of the transition period from Merovingian letters to those of the Carolingian Renaissance,⁷⁸ and the name itself is most probably of lower Frankish origin.⁷⁹ The use of crosses also points to a manufacture in the Christian Frankish/German Empire.⁸⁰

POSSIBLE REASONS FOR THE DEVELOPMENT OF VLFBERHT SWORDS

The production of VLFBERHT blades began around 800 at the earliest, and all of them are of Geibig's blade type 2 or 3.⁸¹ These types evolved in the middle of the eighth century as a reaction to new combat requirements. In the Frankish Empire, the use of centre-gripped, large flat round shields was given up around that time, and domed round shields came into use. Flat round shields do not offer much protection when used defensively with their face towards the opponent but they are well suited to offensively transfer force via their rim. When fighting with a flat round shield with the rim extended forward, using the shield as a weapon to manipulate the opponent, the sword hand almost always stays behind the shield, making the necessity for additional hand protection very low. This is also evident from the shape of the earlier sword hilts, as they offered hardly any protection for the sword hand. Also, blade-on-blade-contact will not regularly occur. The domed round shield, on the other hand, cannot transfer force via the rim, but as weapons will slide off the curved surface, it offers much more protection when held with its face towards the opponent. In this way, it

possible spelling out of mostly two is given. The last two swords (V.II: p. 180 and V.I2: pp. 180–82) are missing on the list.

⁷⁵ Stalsberg, 'Herstellung und Verbreitung', p. 102; *Vlfberht Sword Blades*, p. 19.

⁷⁶ Williams, *Sword*, pp. 61–62, 117.

⁷⁷ Stalsberg, 'Herstellung und Verbreitung' pp. 98, 100; *Vlfberht Sword Blades*, pp. 9–11, 13; Müller-Wille, 'Neues ULFBERHT-Schwert', pp. 70–72, 75.

⁷⁸ Kloos, 'Beschriftungen'.

⁷⁹ Müller, 'Der Name'.

⁸⁰ Stalsberg, 'Herstellung und Verbreitung', pp. 101–3; *Vlfberht Sword Blades*, pp. 18–20.

⁸¹ Geibig, *Morphologische Entwicklung*, pp. 154–56, fig. 38, 41.

had to be used much more statically, so the sword hand had to be exposed more frequently and the sword had to take over some of the defensive functions of the shield. These new requirements were solved by new hilt forms and blade shapes. The sword hand was better protected by wider cross-guards. Longer grips in combination with new pommel shapes allowed the sword to be used in a more protective way.⁸² Thus, blade-on-blade-contact was becoming an integral part of the fighting system. As armour was also used more frequently, blade hardness and toughness were becoming much more important.⁸³

In conclusion, the production of all-steel blades of near-eutectoid or hypereutectoid composition might be explained with an experimental phase during which the swordsmiths tried to make swords that met these new requirements. As hardening those all-steel blades does not seem to have been mastered by the smiths, however, the cutting edges of the resulting blades of group I and II were softer than those of the older composite blades of group III. Furthermore, even the unhardened blades bore the danger of brittleness. This might explain why this method of manufacture was given up after the eleventh century.⁸⁴

LIST OF SWORDS

Swords examined by author in person

1. Bergen (Norway), from a grave

Archäologisches Museum Hamburg, inventory number MfV 1883.375

Literature: Laux, 'Wikingerzeitlicher Grabfund'.

Hilt: undetermined, blade: undetermined

Signature: slight traces of inlaid iron strips on one side

Most of the blade is free from corrosion. The metal in some places shows streaks indicating a layered structure with excellent forge welds.

2. Hamburg, Billwerder Bucht

Archäologisches Museum Hamburg, without inventory number

Literature: Geibig, *Morphologische Entwicklung*, cat. no. 340; Müller-Wille, 'Krieger', cat. no. 71, fig. 14.4.

Hilt: Geibig combination type 15, blade: undetermined

Signature: pseudo-inscription with letters and letter-like forms on both sides, on one side the beginning and the end are marked by a crutch cross

The corrosion has been completely removed. Most parts of the surface show a layered structure running parallel to the axis of the blade.

⁸² Warzecha, 'Form folgt Funktion'; Petri, 'Europäische Schwertformen'; Berthold and Petri, 'Passiv oder aktiv'; Mäder in the volume at hand.

⁸³ The author would like to thank Roland Warzecha for numerous discussions and helpful suggestions.

⁸⁴ Cf. Williams, *Sword and Crucible*, pp. 116, 230, 232.

3. Hamburg, from the River Elbe (fig. 1)

Museum für Hamburgische Geschichte / Hamburg-Museum, inventory number 1965:124

Literature: Geibig, *Morphologische Entwicklung*, cat. no. 342; Müller-Wille, 'Krieger', cat. no. 78, fig. 11.5; Stalsberg, 'Herstellung und Verbreitung', cat. no. D4; 'Vlfberht sword blades', cat. no. D4; Williams, *Sword and Crucible*, pp. 125–26; Wiechmann, 'Wege', p. 443, 445 fig. 4.

Hilt: Geibig combination type 10, blade: probably Geibig type 2

Signature: Stalsberg type 1, mark: Stalsberg type I

The corroded blade has been electrolytically cleaned. Nearly the whole surface of the blade clearly shows a layered structure.

4. Hamburg, from the River Elbe at Lühesand

Museum für Hamburgische Geschichte / Hamburg-Museum, inventory number 1923:48

Literature: Geibig, *Morphologische Entwicklung*, cat. no. 344; Müller-Wille, 'Krieger', cat. no. 83, figs 12.7, 17.1.

Hilt: close to Geibig combination type 5, blade: probably Geibig type 2

Signature: pattern-welded centre with an hour-glass shaped inlay made from iron strips on one side

Most of the corrosion has been removed. The centre shows clear welding lines following the pattern. The edges show clear welding lines in some places, partially parallel to the axis of the blade, partially confused.

5. Hamburg-Bergedorf, from a grave

Archäologisches Museum Hamburg, inventory number M 1163

Literature: Geibig, *Morphologische Entwicklung*, cat. no. 339; Müller-Wille, 'Krieger', cat. no. 70, fig. 11.3.

Hilt: Geibig combination type 6, blade: undetermined

Signature: no inscription

The blade is covered with a smooth dark brown-black patina. It shows several groups of slight lines running parallel to the axis of the blade.

6. Schwedt/Oder (fig. 2)

Museum für Vor- und Frühgeschichte, Staatliche Museen zu Berlin, inventory number If 16773

Literature: Williams, 'Warfare', p. 103, fig. 39.

Hilt: Geibig combination type 10, blade: Geibig type 3

Signature: Stalsberg type 1, mark: Stalsberg type I

Analyses of the metal of the blade by the *Bundesanstalt für Materialforschung und -prüfung*: Carbon content of 0.54%.⁸⁵ The sample has been taken more or less in the middle of the blade in the area of the left arm of the first cross of the inscription. As has been shown by several analyses,⁸⁶ the letters are pure iron, so the original carbon content is probably higher and has been lowered in the analyses by mixing the metal of the blade with the metal of the

⁸⁵ Analyses performed in 1975, reference number: 1.4/0583.

⁸⁶ Cf. Williams, *Sword and Crucible*, p. 131, fig. 16.

letter. Nearly the whole blade is covered by a smooth, hard, black patina. In the places where the patina has fallen off, the surface of the slightly corroded blade shows clear welding seams running more or less parallel to its axis. An X-ray image shows welding seams in the upper part of the tang. A micro computed tomography of the complete cross section of the blade has been carried out in the area of the letters “LF(B)E” (fig. 2c–e). It shows clear welding seams evenly distributed throughout the whole blade.

7. Stade, from the River Schwinge

Archäologisches Museum Hamburg, inventory number 1922 47:1

Literature: Geibig, *Morphologische Entwicklung*, cat. no. 235, tab. 144; Müller-Wille, ‘Krieger’, cat. no. 88, fig. 14.5.

Hilt: Geibig combination type 15, blade: probably Geibig type 6

Signature: a pseudo-inscription made up of vertical lines, zig-zag lines, a cross and single letters on both sides

The corrosion layer has been completely removed. Nearly the whole surface of the blade shows a clear layered structure.

8. Stade, from the River Schwinge

Schwedenspeicher-Museum Stade, inventory number 118

Literature: Geibig, *Morphologische Entwicklung*, cat. no. 232, tab. 141; Müller-Wille, ‘Krieger’, cat. no. 85, fig. 14.1.

Hilt: Geibig combination type 12, blade: probably Geibig type 5

Signature: +BENNOMEFECI on one side and +INOMINEDN+ on the other, the crosses being crutch crosses.

The whole blade shows a fine texture running parallel to the axis of the blade.

9. Stade, from the River Schwinge

Schwedenspeicher-Museum Stade, inventory number 2801

Literature: Geibig, *Morphologische Entwicklung*, cat. no. 234, tab. 143; M. Müller-Wille, ‘Krieger’, cat. no. 87, fig. 14.2.

Hilt: Geibig combination type 12, blade: probably Geibig type 5

Signature: +NISOMEFET+ on one side and +NINOMINED+ on the other, the crosses being crutch crosses.

The whole blade shows a fine texture running parallel to the axis of the blade. At the broken end, the blade is split into layers parallel to the surface of the blade.

10. Unknown

Deutsches Klingenmuseum Solingen, inventory number 1959.W.128

Literature: Geibig, *Morphologische Entwicklung*, cat. no. 179, tab. 109; Grotkamp-Schepers et al., *Das Schwert*, cat. no. 7

Hilt: special form, blade: Geibig type 2

Signature: INGELRII, mark: Stalsberg type I

The whole surface of the slightly corroded blade clearly shows a layered structure, partly

as welding seams and partly as alternating smooth and rough stripes running more or less parallel to its axis.

11. Unknown

Deutsches Klingenmuseum Solingen, inventory number 1973.W.005

Literature: Geibig, *Morphologische Entwicklung*, cat. no. 178, tab. 108; Stalsberg, 'Herstellung und Verbreitung', cat. no. D12; *Vlfberht Sword Blades*, cat. no. D12; Williams, *Sword and Crucible*, p. 125; Grotkamp-Schepers et al., *Das Schwert*, cat. no. 6.

Hilt: undetermined, blade: Geibig type 3

Signature: Stalsberg type 1, mark: Stalsberg type I

Nearly the whole surface of the slightly corroded blade shows clear welding seams running more or less parallel to its axis, indicating a layered structure.

12. Awecken (fig. 3)

Museum für Vor- und Frühgeschichte, Staatliche Museen zu Berlin, inventory number PM Pr 347

Literature: unpublished

Hilt: possibly Geibig combination type 11, blade: Geibig type 3

Signature: Stalsberg type 1, mark: Stalsberg type I

Nearly the whole sword is covered with a smooth, hard and black patina. Slight lines run more or less parallel to the axis of the blade, mainly in the part close to the broken end. An X-ray image shows welding seams in the upper part of the blade. A micro computed tomography of the complete cross section of the blade has been carried out in the area of the letters "FBER" (fig. 3c–e). It shows clear welding seams evenly distributed throughout the whole blade.

13. Wiskiauten, grave 11 of the burial site in the forest "Kaup" (fig. 4)

Museum für Vor- und Frühgeschichte, Staatliche Museen zu Berlin, inventory number PM V.145,7746

Literature: Ibsen, 'Wiskiauten', pp. 72–73, fig. 2; Menghin, 'Wikingerschwert'.

Hilt: Geibig combination type 2, blade: Geibig type 3

Signature: heavily corroded, Stalsberg type VII, mark: heavily corroded, possibly Stalsberg type I

The upper part of the blade is damaged by corrosion, whilst the lower part is covered with a smooth, hard and black patina in places showing blisters. Where the patina has fallen off, the surface of the corroded blade shows clear welding seams running more or less parallel to its axis. A micro computed tomography of the complete cross section of the blade has been executed in the area of the letters "(V)(I)(F)(B)" (fig. 4c–e). It shows clear welding seams evenly distributed throughout the whole blade.

14. Zohpen (fig. 5)

Museum für Vor- und Frühgeschichte, Staatliche Museen zu Berlin, inventory number PM 1928:1070

Literature: unpublished

Hilt: between Geibig combination types 11 and 12, blade: Geibig type 3

Signature: Stalsberg type VI, mark: Stalsberg type VII

The corroded blade has been electrolytically cleaned. Nearly the whole surface of the blade clearly shows a layered structure. An X-ray image shows welding seams in the upper half of the blade. A micro computed tomography of the complete cross section of the blade has been executed in the area of the letters “+V(I)(Γ)” (fig. 5c–e). It shows clear welding seams evenly distributed throughout the whole blade.

Swords with published information about the blade material

15. Essen

Cathedral treasury

Literature: Pothmann, *Zeremonialschwert*.

Hilt: Geibig combination type 12, blade: Geibig type 3

Mark: similar to Stalsberg type IV (on both sides)

The blade has a carbon content of 1.1%; its composition matches that of Minette ore from Lorraine (FR).⁸⁷ X-ray images show clear welding seams in all parts of the blade running parallel to its axis.⁸⁸

16. Großenwieden, from the river Weser

Niedersächsisches Landesmuseum Hannover, inventory number unknown

Literature: Wulf, ‘Großenwieden’.

Hilt: undetermined, blade: undetermined

Signature: Stalsberg type I, mark: undetermined

The published picture shows groups of clear welding seams in different places evenly distributed over the whole blade.⁸⁹

17. Hamburg, from the river Elbe

Museum für Hamburgische Geschichte / Hamburg-Museum, inventory number M 1152

Literature: Geibig, *Morphologische Entwicklung*, cat. no. 341; Müller-Wille, ‘Krieger’, cat. no. 79, figs 13.6, 17.2; Stalsberg, ‘Herstellung und Verbreitung’, cat. no. D3; *Vlfberht Sword Blades*, cat. no. D3; Williams, *Sword and Crucible*, pp. 122–23; Jankuhn, ‘Ulfberht-Schwert’.

Hilt: Geibig combination type 12, blade: probably Geibig type 3

Signature: Stalsberg type I, mark: Stalsberg type II

The blade has a carbon content of 1.2%.⁹⁰ The drawing and the photographs published by Müller-Wille clearly show several evenly distributed groups of elongated structures running parallel to the axis of the blade.⁹¹ These are most probably welding seams.

⁸⁷ Pothmann, ‘Einleitung’, p. 3.

⁸⁸ Westphal, ‘Untersuchung’, p. 65, figs 23–68, fig. 26.

⁸⁹ Wulf, ‘Großenwieden’, fig. 50.

⁹⁰ Jankuhn, ‘Ulfberht-Schwert’, p. 224.

⁹¹ Müller-Wille, ‘Krieger’, figs 13.6, 17.2.



FIG. 1a: VLFBERHT-sword from Hamburg (Inventory no: 1965:124, Museum für Hamburgische Geschichte/Hamburg-Museum.); b: Detail of the VLFBERHT sword from Hamburg showing the layered material structure.





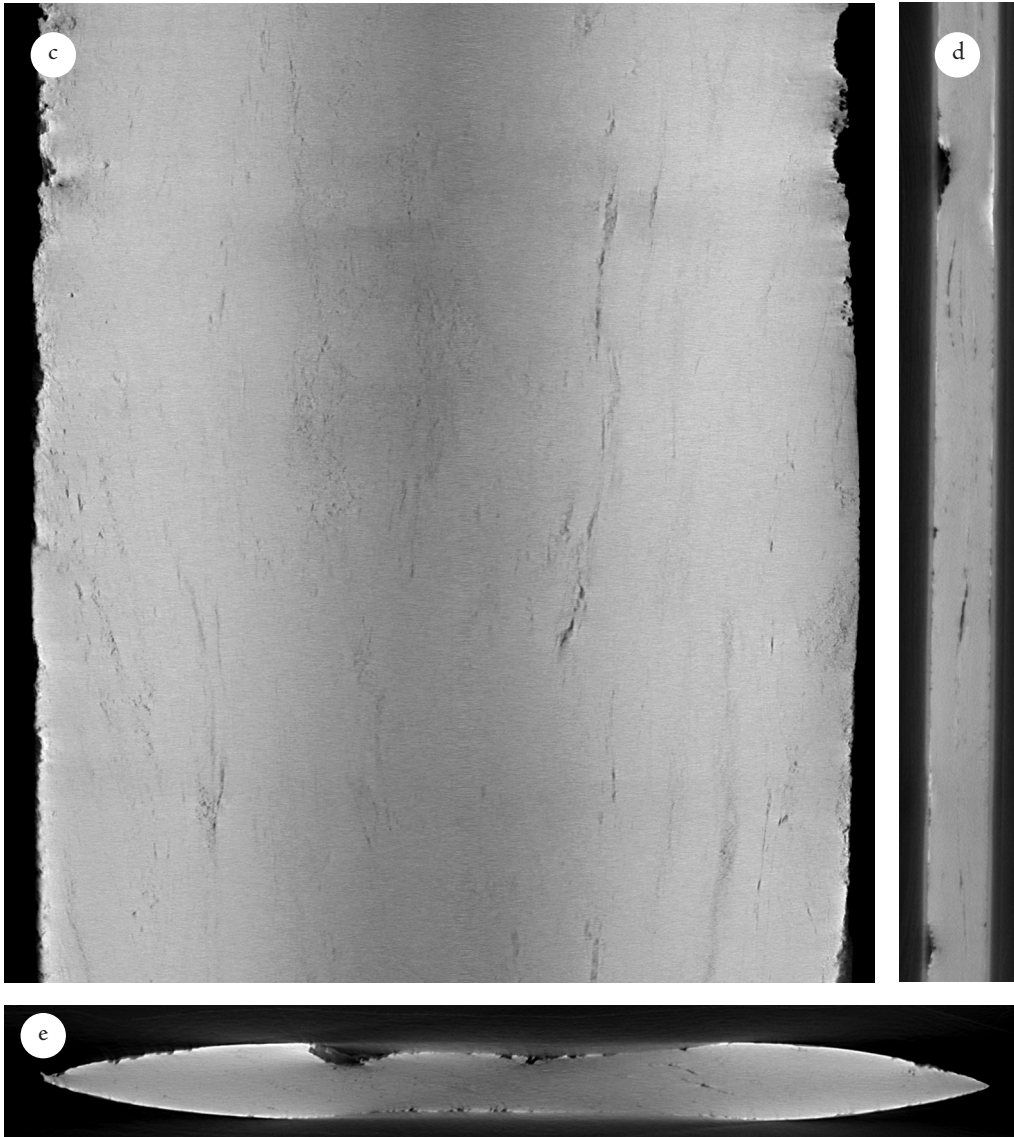


FIG. 2a: VLFBERHT-sword from Schwedt/Oder (Inventory no: If 16773, Museum für Vor- und Frühgeschichte, Staatliche Museen zu Berlin.); b: Detail of the VLFBERHT-sword from Schwedt/Oder showing the welding seams running more or less parallel to the axis of the blade in the lower right quarter; c: Micro computer tomographical section of the blade of the VLFBERHT-sword from Schwedt/Oder showing welding seams. Section from cutting edge to cutting edge; d: Micro computer tomographical section of the blade of the VLFBERHT-sword from Schwedt/Oder showing welding seams. Section in the area of the spine below the inscription. e: Micro computer tomographical section of the blade of the VLFBERHT-sword from Schwedt/Oder showing welding seams. Section between the letters "(B)" and "E".



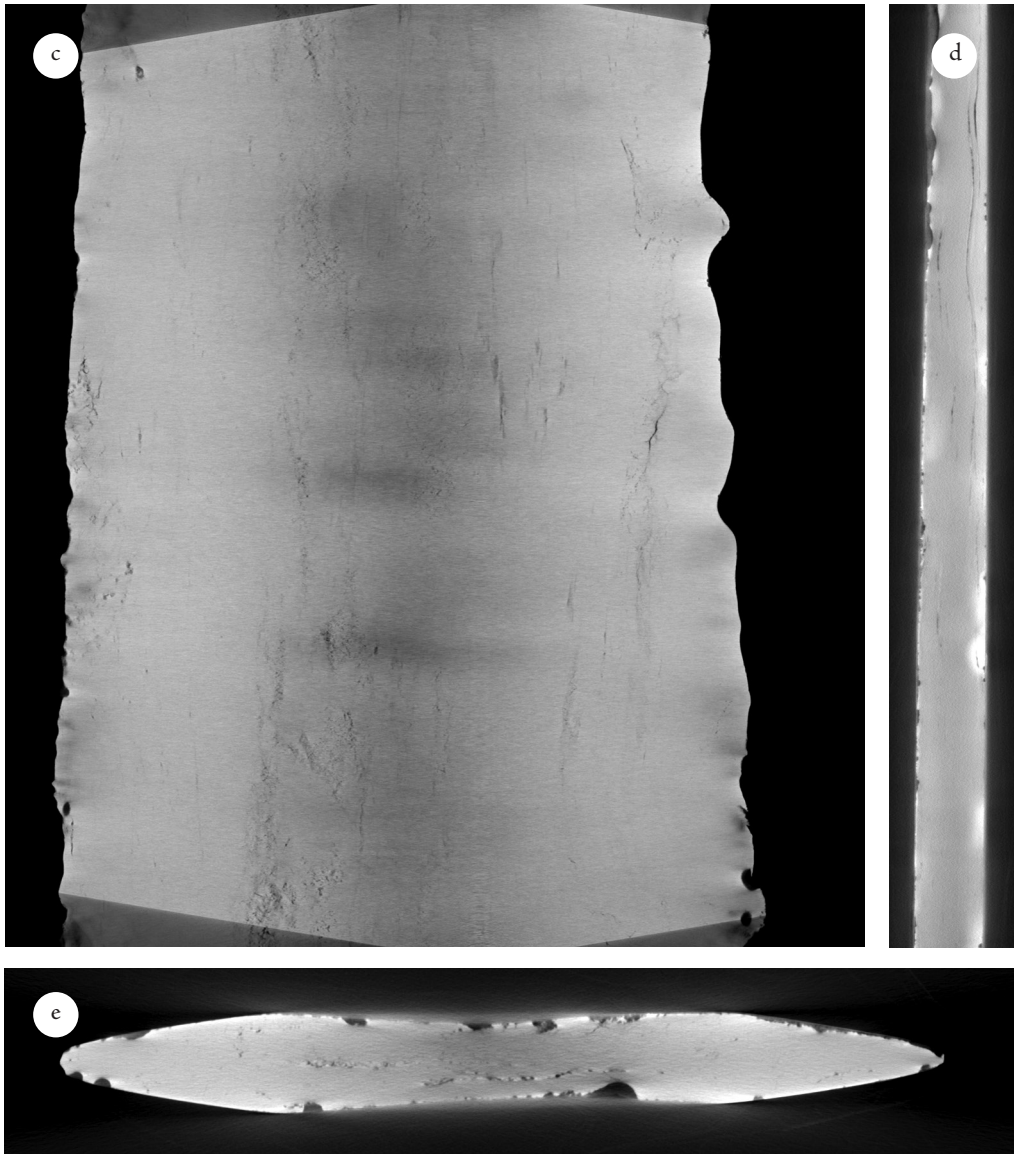


FIG. 3a: VLFBERHT-sword from Awecken. (Inventory no: PM Pr 347, Museum für Vor- und Frühgeschichte, Staatliche Museen zu Berlin.); b: Detail of the VLFBERHT-sword from Awecken showing the slight structures running more or less parallel to the axis of the blade in the lower half of the picture; c: Micro computer tomographical section of the blade of the VLFBERHT-sword from Awecken showing welding seams. Section from cutting edge to cutting edge; d: Micro computer tomographical section of the blade of the VLFBERHT-sword from Awecken showing welding seams. Section in the area of the spine below the inscription. e: Micro computer tomographical section of the blade of the VLFBERHT-sword from Awecken showing welding seams. Section between the letters "(L)" and "F".



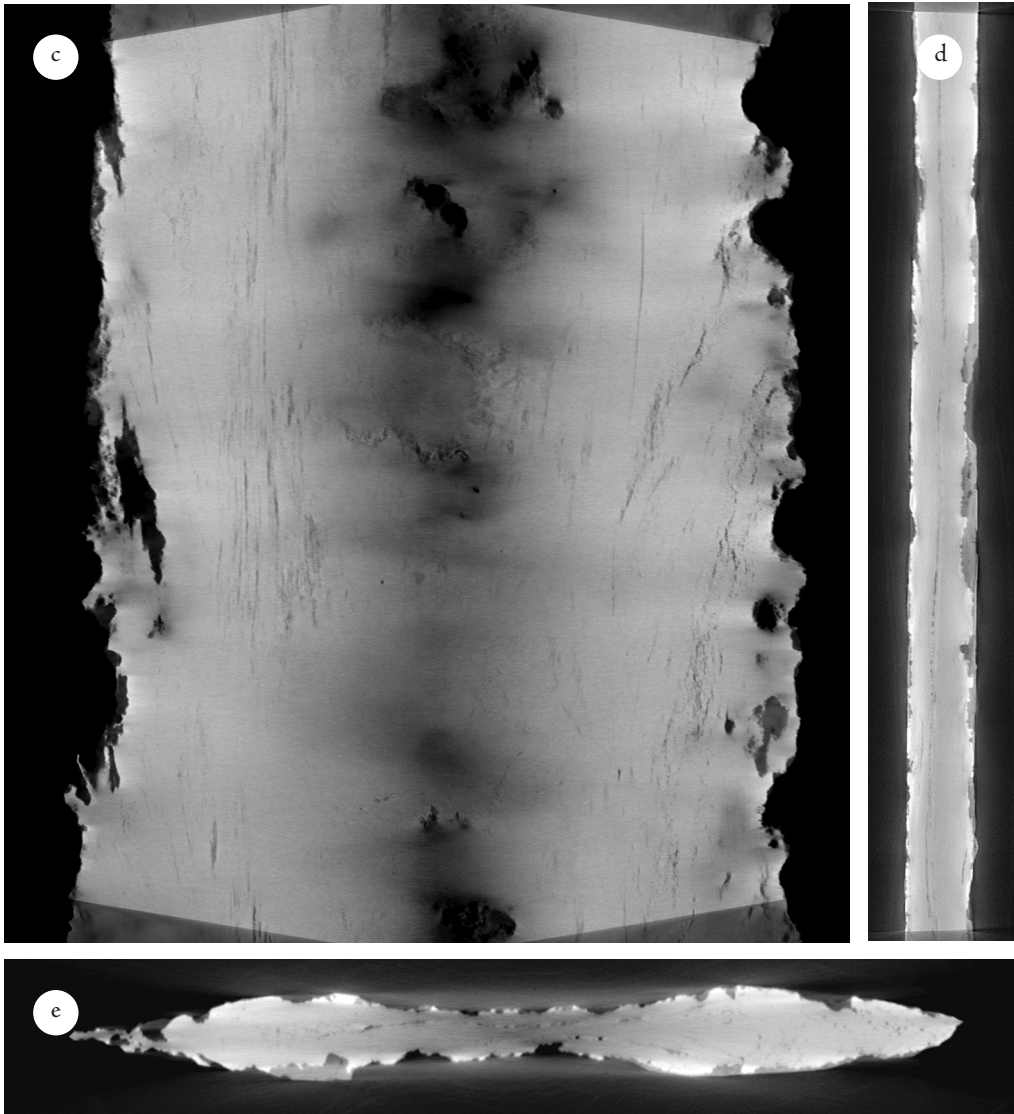


FIG. 4a: VLFBERHT-sword from Wiskiauten. (Inventory no: PM V,145,7746, Museum für Vor- und Frühgeschichte, Staatliche Museen zu Berlin.); b: Detail of the VLFBERHT-sword from Wiskiauten showing the welding seams running more or less parallel to the axis of the blade in the lower half of the picture. c: Micro computer tomographical section of the blade of the VLFBERHT-sword from Wiskiauten showing welding seams. Section from cutting edge to cutting edge. d: Micro computer tomographical section of the blade of the VLFBERHT-sword from Wiskiauten showing welding seams. Section in the area of the spine above the inscription. e: Micro computer tomographical section of the blade of the VLFBERHT-sword from Wiskiauten showing welding seams. Section between the letters "(I)" and "(F)".



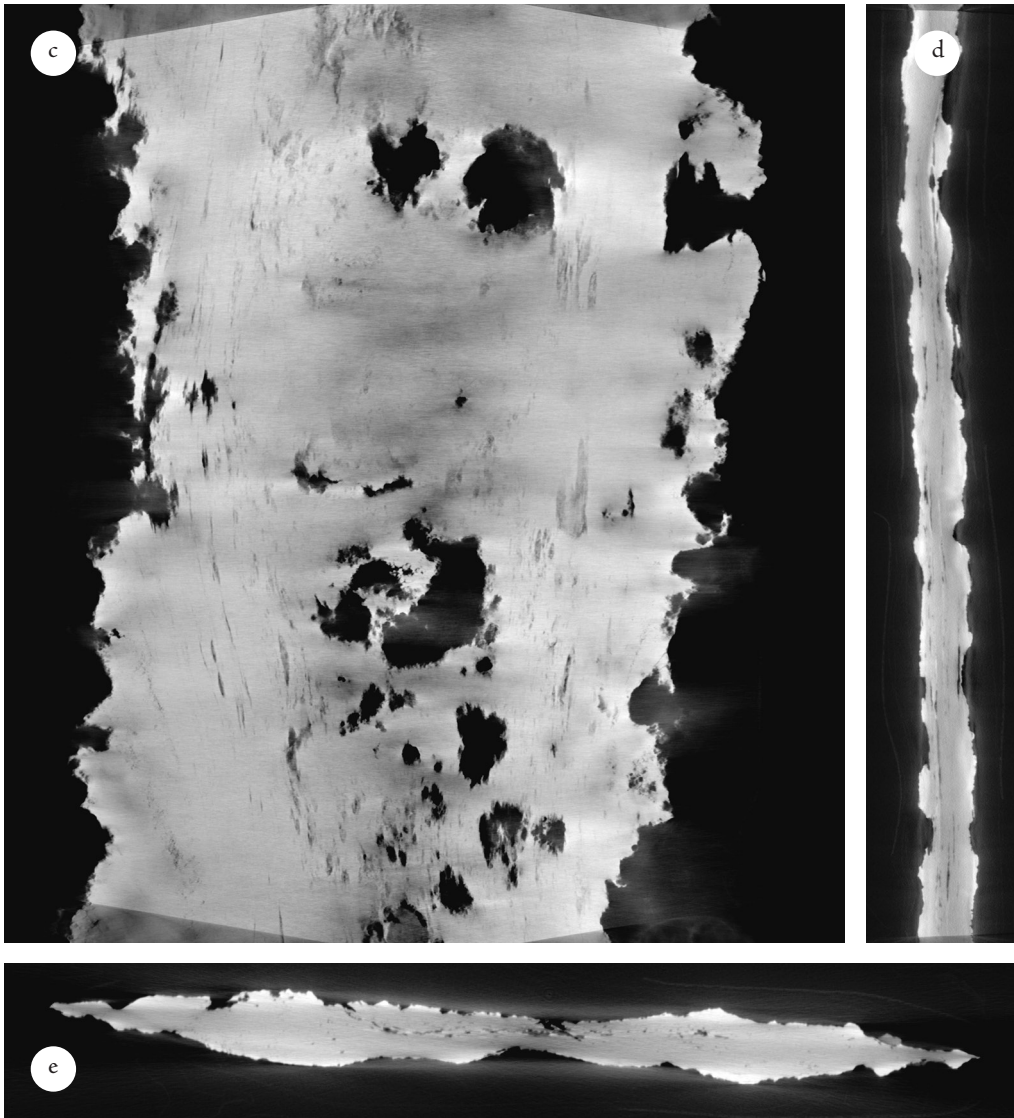


FIG. 5a: VLFBERHT-sword from Zohpen. (Inventory no: PM 1928:1070, Museum für Vor- und Frühgeschichte, Staatliche Museen zu Berlin.); b: Detail of the VLFBERHT-sword from Zohpen showing welding seams running more or less parallel to the axis of the blade; c: Micro computer tomographical section of the blade of the VLFBERHT-sword from Zohpen showing welding seams. Section from cutting edge to cutting edge; d: Micro computer tomographical section of the blade of the VLFBERHT-sword from Zohpen showing welding seams. Section in the area of the spine below the inscription; e: Micro computer tomographical section of the blade of the VLFBERHT-sword from Zohpen showing welding seams. Section between the letters “+” and “V”.

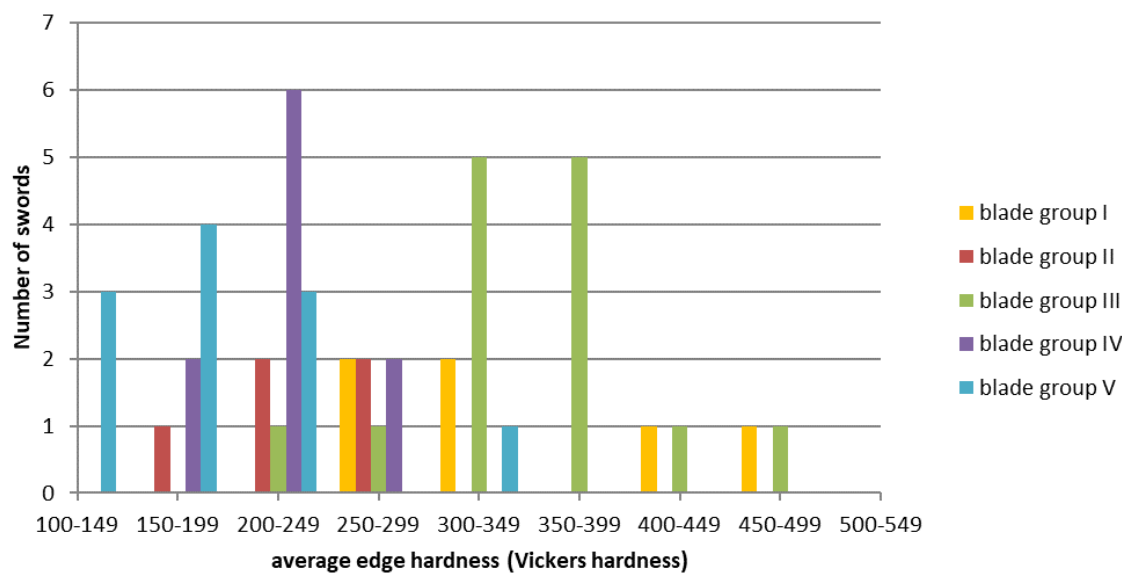


FIG. 6: Distribution of average edge hardness in Williams’ blade groups I–V.

A Sword from the Rhine

Restoration, Examination and Classification of a Chance Find

Holger Becker

*I*N THE SUMMER OF 2003, a chance find was made in a dried-out part of the River Rhine near Bonn. It was subsequently acquired by the LVR-Landesmuseum Bonn in 2005. Work began in the conservation department, with the hope of substantiating the initial suspicion that this particular find could be a medieval sword. After having been successfully restored, the object was classified and dated by material analysis, as well as by defining typological characteristics and applying comparative studies of swords from different European collections. This article aims at demonstrating the interdisciplinary collaboration of restoration, natural science, archaeology and art history finally succeeded in fully understanding this find.

The summer of 2003 was the hottest on record for 250 years.¹ As a result of the high temperature, large parts of the riverbed of the Rhine dried out and made usually waterlogged areas accessible. A resident taking a walk in Beuel, an urban district in the city of Bonn, came upon a chance find of a totally corroded sword-shaped object encrusted with sediments. After his attempt to remove these layers of sediment had proved unsuccessful, and thus been abandoned, he contacted the museum (fig. 1). Two years later, the museum acquired the object and started to restore and examine this chance find with the aim of historical classification.

INITIAL INFORMATION

While the outer shape of a sword was immediately evident, X-ray imaging² revealed further information hidden under the encrusted sediments. Digital images as well as X-ray films were used to detect radiation. The images exhibited details which gave a deeper understanding of the construction of the blade, its massive pommel and a cross-shaped inlaid mark. Given the high absorption of X-ray energy, it was clear that these parts were made from a copper alloy

¹ Following the IPCC report (Intergovernmental Panel on Climate Change) the summer of 2003 was one of the hottest of the last 250 years. IPCC, *Climate Change* 2013.

² X-ray system GE-Inspection Technologies, DP 435 vario.



FIG. 1: Sword hilt before restoration.

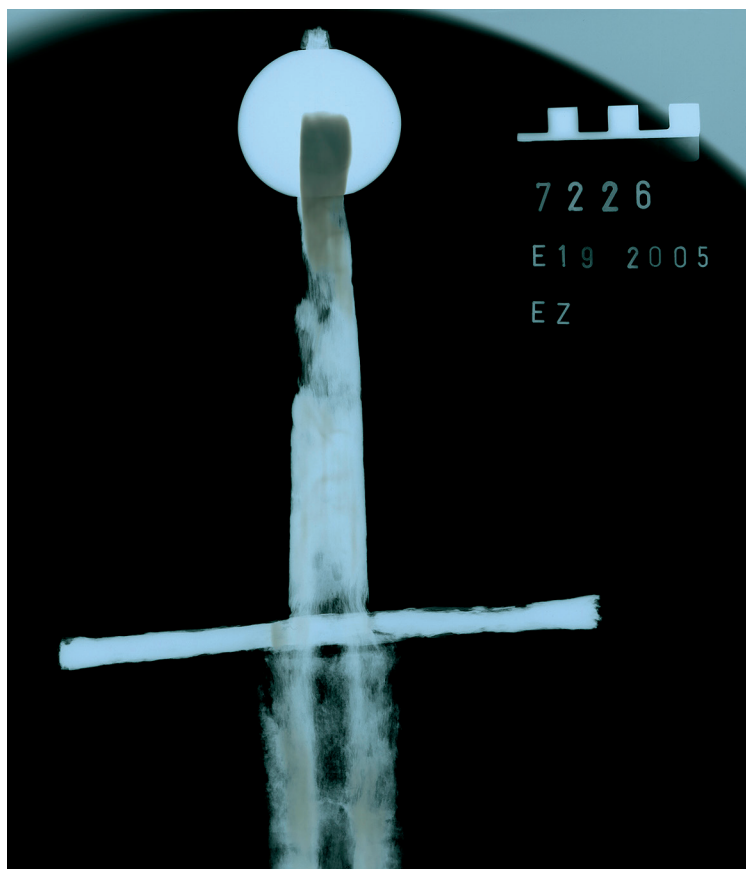


FIG. 2: X-ray image of hilt.

or even a high-quality metal (fig. 2). Aside from technical details, the X-ray images revealed the heterogeneous condition of the blade's material. In direct proximity to one another were areas of metallic iron and areas which had been totally transformed by corrosion so that they were no longer detectable.

RESTORATION AND CONSERVATION

As finds are not just antiques, but rather archaeological sources, all restoration measures aim to restore and preserve them as well as reveal information for scientific investigations. Due to the fact that objects always have to be considered within a wider context, not only is the information regarding manufacturing techniques of importance, but also all damages caused by usage and repairs. The process of revealing the story of an object can be similar to police work and forensic science.

The restoration measures on the sword from the Rhine started with mechanical cleaning to prepare the original surface. When cleaning iron objects, there is never an apparent defined zone between the corrosion layer and the original surface. An experienced eye is needed to identify this zone, which is often only detectable with the help of a microscope. As iron develops hard corrosion layers, incorporating pebbles from the surrounding soil, different techniques were necessary for efficient abrasion. Firstly, the layer was reduced by grinding techniques, using fast rotating diamond-bonded abrasives of different shapes. Then, for the preparation of the original surface, micro sandblast equipment using glass bubbles with a maximum grit size of 50 micrometres was applied.³ For removing iron corrosion, the combination of grinding and sandblasting techniques gave satisfactory results. These techniques, however, failed in the area surrounding the pommel. As the shiny metal surface became visible under the layer of corrosion, the risk of damaging the original surface with the abrasive cleaning equipment could not be ruled out. Conferring with the Institute of Laser Technology of the University of Münster in Steinfurt provided a better solution for this particular cleaning problem, and the idea of using laser techniques turned out to be a productive one. The chartered engineer, Jens Hildenhagen, chose a stationary Nd YAG-cleaning laser for preliminary tests, which proved to be a useful tool.⁴ The operating mode of the cleaning lasers relied on a local thermal shock reaction. Using part of the photon energy for a sudden heating of the direct surface, the laser beam caused a spalling of the amorphous corrosion layer. While operating, it turned out that partially moistening the corrosion layer facilitated the mechanical impact due to the developing water vapour pressure. The pommel was ideal for laser application because the different optical appearance of the metallic, bright surface and the amorphous corrosion caused a self-regulating limitation of laser operation. Thus, the original surface could be cleaned carefully and in a time-saving manner. The

³ Micro-sandblast equipment, type Sandmaster®, FG 3-92, Sandmaster AG, Mühlethalstr. 67, CH-4800 Zofingen.

⁴ Nd YAG-cleaning laser, Thales company, Type SAGA 220/10, laser-type: Nd YAG, wavelength: 1064nm, energy density: ca. 400mJ/cm².

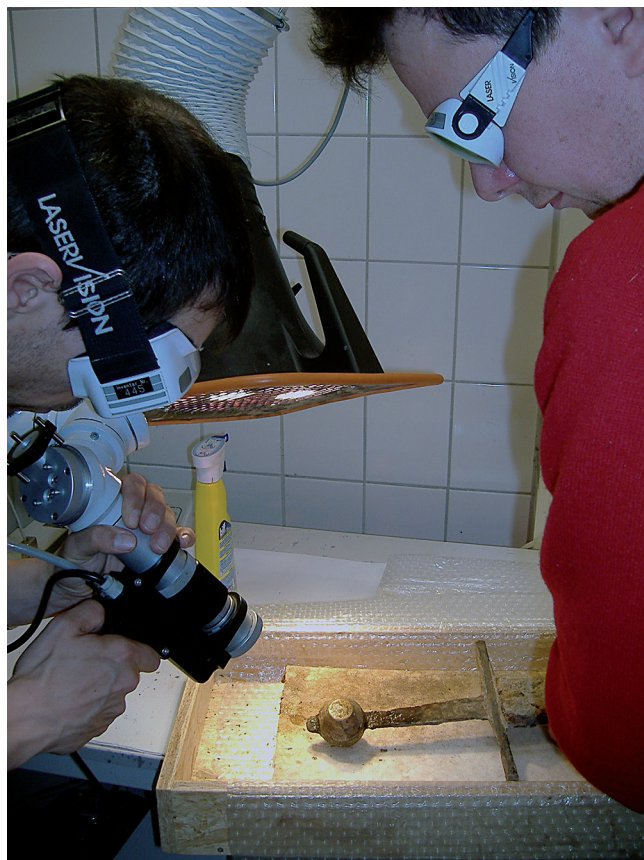


FIG. 3: Laser cleaning of pommel.

thermal strain caused by the energetic input of laser beams could be disregarded, due to the limited local affection of an extremely thin material layer of only 0.15 micrometres. The energy was additionally dissipated as a result of the optimal thermal conductivity of copper alloys (fig. 3).

Surface defects and cracks caused by corrosion made the blade unstable. In particular, one big hole could have led to a complete rupture of the material. To ensure a stable static condition for prospective handling of the object, these defects were filled with epoxy-resin fillings.⁵ For aesthetic reasons, these fillings were then ground down and colour-matched.

Organic remains of the scabbard were also discovered directly underneath the guard and divested of the covering of sediment and corrosion layers. Accurate observation helped to understand the construction of the scabbard. Arranged in layers, the scabbard had been made of wood, covered in leather and lined with fur. While samples of the wood and leather could be taken for further analysis, traces of the fur remained only as structural evidence of the iron corrosion. There, mobilised iron ions conserved the outer shape of the fur in the formation of a pseudomorphosis.

⁵ Epoxy-resin, type Renlam M1, Ciba-Geigy AG, dep. polymere/composites, D-79662 Wehr / Baden.

DETERMINATION OF ORGANIC REMAINS AND MATERIAL ANALYSIS

While the source of the leather was no longer identifiable, the wooden samples were. Dr Ursula Tegtmeier from the Laboratory of Archeo-phytology at the University of Cologne identified the wood from a cross-section of the scabbard as beech (*fagus*, bot.). This identification was confirmed by a later investigation of the tangential area.

Material analysis of the striking lustrous material of the pommel and of the inlaid mark was undertaken to identify the alloy and furthermore answer the question of gilding techniques. X-ray fluorescence analysis (XRF) provided the investigation with both a qualitative and quantitative elementary composition of materials. The term “fluorescence” is applied to phenomena in which the absorption of radiation of a specific energy results in the re-emission of radiation of a different energy, which has energy characteristics of the atoms present. On this basis, a wide spectrum of elements is detectible. As such, analysis of metal alloys as to the composition of ceramic matrixes could be carried out. The conservation department of the LVR-Landesmuseum Bonn operates with a handheld-mobile XRF analyser, with an integrated miniature X-ray tube and detector (fig. 4).⁶ Depending on the chosen measuring mode, the underlying software provides the determination of different groups of materials and their proportion in per cent or ppm. The pommel material might be identified as brass with portions of copper of 79%, of tin almost 10%, of zinc almost 8% and a small amount of lead of 1.5%. The results for the inlaid mark showed a slightly different composition with 65% copper, 15.5% zinc and 0.5% lead. The most obvious difference is found in the quantity of tin which amounts to just 0.5%.⁷

In comparison with recently produced samples of brass, which were kindly provided by Wieland Werke AG in Ulm, the similarities became obvious. These samples, produced under the term “ α -Sondermessing” (special brass), delivered diffraction patterns in reference to yellow brass alloys from the early eighteenth century.⁸ The amount of zinc in these samples could vary from 22% to a maximum of 28%, but mostly measurement readings of 22% to 25% were recorded. Brass material used for pommels or inlaid marks are also mentioned in the literature for different medieval swords.⁹



FIG. 4: Inlaid mark.

⁶ Thermo-scientific portable analyser, type Niton XL3 t.

⁷ Analyses were taken in metal alloy mode, over a period of 120 seconds. The quoted data is rounded down slightly to average between the different counts. Single readings mostly differed in a range of less than 0.4%.

⁸ I'd like to thank Dr J. Riedle from the research laboratory of Wieland-Werke AG for providing the samples.

⁹ Geibig, *Morphologische Entwicklung*, pp. 45, 132.

TYPOLOGICAL CHARACTERISTICS

Based on the Oakeshott Institute's *Sword Documentation* classification system¹⁰ the sword from the Rhine at Bonn could be described as follows:

General dimensions

Overall length:	103cm
Weight:	1.530g

Blade dimensions

Blade length (guard to tip):	82.7cm
Blade width (quillon block):	5.6cm
Blade width (5 cm from tip):	3.8cm
Blade thickness (quillon block):	0.49cm
Fuller length:	45cm
Fuller width:	1.2cm
Cross-section:	Double concave

Hilt dimensions

Grip length:	13.6cm
Guard width:	18cm
Guard height at quillon block:	0.9cm
Guard thickness at quillon block:	1.6cm
Pommel width:	5.3cm
Pommel height:	4.7cm
Pommel thickness:	4.5cm
Pommel type:	Wheel pommel
Material of the pommel:	Brass

The blade, with its short fuller (half the length of the blade) and straight cutting edges, is not pattern welded and tapers gradually in width towards the point, which is shaped like a gothic arch. The blade shows no signs of composite construction, and seems to be made of a single piece of steel. Even the degraded conditions of the archaeological find adumbrate the flexibility and sharpness of the former blade. The double concave cross-section of the blade is typical for swords from the end of the thirteenth century. Close to the cross-guard the blade reveals an inlaid mark in form of four arrows forming a cross and framed in a circle. The form of cross has a link to the Order of Saint John or the Knights Hospitaller (fig. 4). The X-ray images give a hint to a second mark located above the brass cross. This mark, in the form of an imprinted simple Greek cross in a circle, is likely a maker's mark. The attempt to locate and expose the mark on the blade led to the decision to remove the remains of the scabbard which had covered the mark. Unfortunately, the attempt to find the mark was unsuccessful, due to the pitted surface of the corroded iron.

¹⁰ The Oakeshott Institute, 'Sword Documentation Project'.

The sword has a wheel pommel with concave bevels and a straight cross-guard, with a square cross-section that swells slightly in the middle and at the ends. All of these characteristics lead into a typological classification of type XIIa for the blade and type J for the pommel according to Oakeshott's system.¹¹ Based on this characterisation, the sword could be dated from the second half of the thirteenth century to the first half of the fourteenth century. This sets the piece into context of the medieval Slovakian swords published by A. Ruttkay.¹²

MANUFACTURING CHARACTERISTICS

Based on the results of the investigations of the *Passauer Wolfsklingen* by H. Huther,¹³ we may assume that the sword from Bonn was manufactured by a division of labour. The blade would have been produced on its own and then tested by master craftsmen of the appropriate guild, in accordance with contemporary quality checks. Although the preparation of the imprinted maker mark failed, it could be detected in the form of a simple Greek cross with X-ray imaging. The inlaid brass mark could provide evidence for a local guild mark, and would be supplemented by an imprinted maker mark in the tang, or alternatively on the blade beneath the guard. A further group of specialised craftsmen would then have continued the sword's manufacturing process by adding the hilt. Referring to the work of Huther, these specialists could be members of the guild of the knife makers, who in the case of the German city of Passau in 1299, still operated independently of the swordsmiths. They specialised in producing hilts, grips and fittings. In contrast to the swords discussed by A. Geibig, the cross-guard of the sword from Bonn simply rests on the blade's shoulder without any additional fixings. A similar construction can be observed on a sword from Weesen¹⁴ held in the collection of the Schweizerisches Landesmuseum in Zurich, where the guard is attached to the tang and simply rests on the shoulder. The next step was to fix the pommel to the tang by soldering. Remaining solder could be detected on both sides of the brass surface of the pommel where it connected to the iron tang. Finally, the grip was attached. Due to the fact that no remains of the grip material have been preserved, preliminary findings have to be translated on to the sword from Bonn. Typical grips of contemporaneous swords were constructed of two wooden halves covered with leather, which was usually glued to the handle, or attached by wrapping a cord around it in a helix. Due to the hilt construction of the sword from Bonn, its grip could only have been made out of two shells. A grip made out of one piece and slipped over the tang would have made the fixing of the pommel by soldering impractical. Besides, this specific grip construction fixed the cross-guard by using the pommel as a skewback. This

¹¹ Oakeshott, *Archaeology of Weapons*, pp. 207–9, fig. 86; p. 225, fig. 106.

¹² Ruttkay, 'Waffen und Reiterausrüstung', p. 138, cat. no. 32, fig. 14,12; p. 163, cat. no. 122, fig. 14,6; p. 182, cat. no. 163, fig. 14,3; p. 203, cat. no. V, fig. 14,4–5; see also pp. 259–63.

¹³ Huther, *Passauer Wolfsklingen*, p. 43.

¹⁴ Sword from Weesen, canton St. Gallen, Schweizerisches Landesmuseum Zürich, inv. no. AG 2462. Schneider, *Waffen im Schweizerischen Landesmuseum*, pp. 26–27, cat. nos 23–25.



FIG. 5: Detail of scabbard.

technical detail needs to be mentioned as there are no further solutions for fixing the cross-guard (like riveting or soldering) which can be observed. Additionally, the fuller leading into the tang could possibly be used to fasten the guard by wedges.¹⁵

The manufacturing of the scabbard and its harness was presumably undertaken by another group of specialist craftsmen. The remaining fragments give a good impression of the composition of the scabbard. The features are comparable to observations made regarding early medieval *spathae*, where, due to moist soil conditions, organic remains have been conserved.¹⁶ The body of the scabbard consists of two half-shell parts of beech wood covered in leather. This cover was sewn together along the middle of the reverse side. Observations of the remaining fragments show a semi-circular opening on the reverse side beneath the cross-guard. On the front side, the scabbard formed a straight edge. With the later dismounting of the scabbard-fragments, the fur provided structural evidence as to the iron corrosion. Fur linings aided in fixing the sword mechanically into the scabbard and provided a greasy environment for the blade. No analysis provided information which could lead to a reconstruction of the harness (fig. 5).

¹⁵ Personal note from Peter Johnsson, Uppsala, May 2016.

¹⁶ Menghin, *Schwert*, pp. 12 and 94; Heege, *Grabfunde*, pp. 210–12.

HISTORICAL CLASSIFICATION

Comparative studies based on the typological characteristics of the sword from Bonn should help with the historical classification and dating of this chance find. In the immediate vicinity are two swords, one in the collection of the Stadtmuseum in Cologne and the second in the collection of the Deutsches Klingenmuseum in Solingen. Whereas the first could be accessed, the latter (published by A. Geibig¹⁷) is no longer part of the collection.¹⁸ Due to the fact that swords were distributed across the whole of Europe, these regional references have to be considered critically. The enquiry showed that swords with similar typological characteristics were represented in several important European collections.¹⁹ For comparative studies, swords from the collections of the Stadtmuseum in Cologne, the Schweizerisches Landesmuseum in Zurich, the Nationalmuseet in Copenhagen and the Museum of London are used (see table 1). A further analogy from the Musée de l'Armée in Paris (inventory: J 7) can only be mentioned. The dimensions collected and presented in the table were taken on the spot in Cologne, Zurich and London during spring 2009. The dimensions of the swords from Copenhagen and Paris were provided by courtesy of colleagues in the collections. Besides typological similarities, the collected data shows varying dimensions and features. In this canon, the sword from London represents the longest example, whereas the swords from Bonn and Cologne are slightly shorter. The dating of the recorded objects varies between the mid-thirteenth century and the mid-fourteenth century and allows a first dating of the sword from Bonn into this time frame. In particular, the shiny brass pommel and the refinement of the inlaid mark give this sword a specific appearance (fig. 6).

Besides the morphological characteristics, the marks might help to provide a more accurate determination of the place of manufacture. The striking inlaid mark, referring to the order of Saint John or the Knights Hospitaller, combines four arrowhead tips in the centre with two tips respectively pointing out of the circle. Whereas four tips often represent the four cardinal virtues like justice, courage, wisdom and temperance,²⁰ the eight outer tips symbolise the eight *beatitudes* after the Gospel of Matthew.²¹ This specific shaped cross, used for the Order of Saint John and the Knights Hospitaller, is

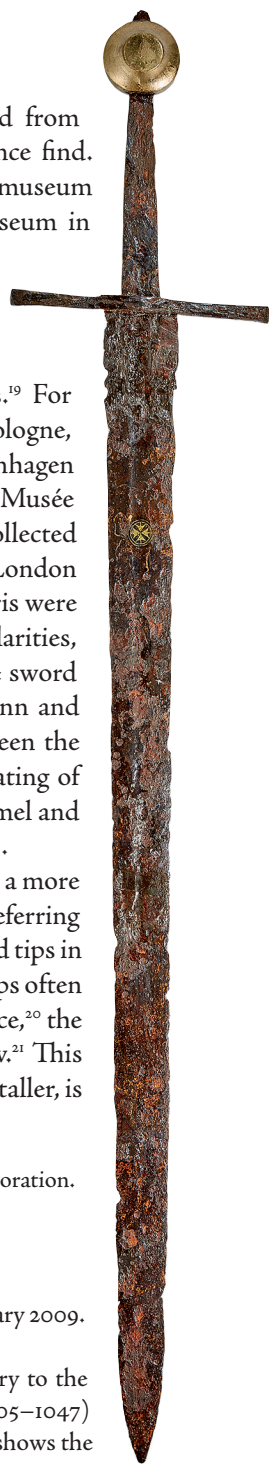


FIG. 6: Sword after restoration.

¹⁷ Geibig, *Morphologische Entwicklung*, table 113; 1–4 cat. no. 182.

¹⁸ Personal note from Lutz Hoffmeister, Deutsches Klingenmuseum Solingen, February 2009.

¹⁹ Oakeshott, 'War Sword', pp. 141–52.

²⁰ These four cardinal virtues could be found on several works of art contemporary to the sword of Bonn, e.g. on the decoration on the sarcophagus of Pope Clemens II (1005–1047) in the Bamberg cathedral. This sarcophagus dated to the mid-thirteenth century shows the four cardinal virtues in a framed relief.

²¹ Matthew 5: 3–12.

however, not mentioned before the end of the fifteenth century.²² Therefore, an association of the sword of Bonn with these chivalric orders seems dubious, even though they were formed in the times of the crusades and confirmed by Pope Eugene III in 1153. On the other hand, the presence of the two orders in the vicinity of Bonn has been established in the time frame to which the sword is dated. Commanderies of the Order of Saint John were located in the northern part of the Central Rhineland in Bad Breisig. In the city of Cologne, documentation shows us that a commandery of the Knights Hospitaller was founded in Duisburg in 1154. Although the connection of orders of knighthood and the find spot of the sword from Bonn can only be linked hypothetically, there remains nonetheless explicit historical evidence for the presence of knights with a relationship to the military orders in the Rhineland. The proximity of the city of Cologne to the find spot is worth being examined more closely. Many written sources document Cologne's reputation for its medieval arms industry. The first municipal law of the city of Strasbourg mentions 1180 *gladii*, which *in navibus de Colonia portantur* ("were transported from Cologne to Strasbourg").²³ The location of specialised manufacturers located in the historic city are also often referenced in place names. Places like *inter gladiatores*, *inter Schwertfegeren* and *inter Schwertgedemen* were named on a map from the end of the thirteenth century and tax lists mentioned *Sverthof* or *Slever-shof*.²⁴

Regarding the question of how the sword actually got into the River Rhine, only speculations can be made. Weapons found in water, especially swords, represent a constant in prehistoric and medieval find inventories.²⁵ In contrast to prehistoric finds, an interpretation of it being a ritual deposition has to be considered unlikely. A. Geibig pointed out in 1991 that "based on the current state of knowledge the majority of swords found in rivers have to be quoted as deposited for profane reasons, such as accidents or martial conflicts. Therefore, ritual deposition, in the sense of votive offerings, is of minor significance".²⁶

Beside the archaeological find as a primary source, information can also be gathered from other sources, such as medieval illustrations and sculptures, which illustrate the original appearances, mountings and applications of swords. The illustrations of the Chronicles of Saxony,

²² Kirchner and Truszczyński, *Ordensinsignien*; Wienand, *Johanniter*; Rödel, *Ritterliche Orden*; Sire, *Knights of Malta*; Trebeljahr, *Karrieren*.

²³ Wiegand, *Urkundenbuch*, p. 470.

²⁴ Becker and Schmauder, 'Hochmittelalterliches Schwert', p. 9.

²⁵ Geisslinger, *Horte als Geschichtsquellen*, pp. 100–7; Bohnsack, 'Mittelalterliches Inschriften-Schwert'; Herfert, 'Frühmittelalterliche Schwerter'; Schulze, 'Flußfunde'; Spindler, 'Gewässerfunde'; Geibig, *Morphologische Entwicklung*, pp. 177–79; Wegner, 'Flussfunde'; Kuhnen, *Abgetaucht, aufgetaucht*; Bleile and Kleingärtner, 'Flußfunde'; Riedel, 'Gaben'; Scholz, 'Überlegungen'.

²⁶ Geibig, *Morphologische Entwicklung*, p. 179: 'Nach jetzigem Kenntnisstand rechnet Verf. für den überwiegenden Teil der in Flüssen gefundenen Schwerter mit profanen Deponierungsgründen wie Unfall oder kriegerische Auseinandersetzungen, während rituelle Deponierungen/Votivgaben allenfalls in geringem Umfang anzunehmen sind'; Theuws and Alkemade underline in reference to Geibig's cautious position that a ritual deposition can be assumed for some of the sword finds: "We are convinced that some of the river finds were the result of deliberate ritual depositions." Theuws and Alkemade, 'Mirror for Men', p. 426, footnote 59.



FIG. 7: Naumburg Cathedral: sculpture of donator Earl Ekkehard of Schwarzburg-Käfernburg.

dated to 1336,²⁷ and the portraits in the Codex Manesse, dated to 1300,²⁸ provide a vivid picture not only of different types of swords, but also of different ways of mounting and of scabbard constructions. The sword type of the example from Bonn, with its striking golden disc-shaped pommel, could be identified in the portrait of the author in *der Düring* (fol. 229r). A further naturalistic impression of this sword type with scabbard and its harness wrapped around it in a helix is given by the sculptures of Earl Ekkehard and Syzzo of Schwarzburg-Käfernburg, donators to the chancel of the cathedral of Saint Peter and Paul in Naumburg, where their statues stand, which is dated between 1260 and 1270 (fig. 7).²⁹ More sculptures illustrate this sword type. Here one should mention the tombstone of Earl Ernst von Gleichen in the Erfurth Cathedral, who died in 1264, and the tombstone of Arnold von Turri in the cloister of the cathedral of Mayence, which is dated to 1268.³⁰ Based on these secondary sources, the dating of the sword found in Bonn can be narrowed down to the last third of the thirteenth century.

ACKNOWLEDGEMENTS

This article is based on a publication published together with Prof Dr Michael Schmauder in 2011.³¹ Special thanks to all the colleagues who provided support and information, and were so kind as to grant access to the collections in Cologne, Zurich and London:

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Lutz Hoffmeister (Deutsches Klingmuseum Solingen),

Peter Johnsson (Uppsala),

Dr Matthias Senn (Schweizerisches Landesmuseum Zurich),

Hendrik Strehlow (Kölner Stadtmuseum / Zeughaus, Cologne),

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Dr Ursula Tegtmeier (Labor für Archäobotanik, University of Cologne).

Finally, I would like to thank Hannah Boddy from the National Museum of Scotland for proofreading and her help in translation.

²⁷ Schormann, 'Waffenkundliche Bemerkungen'.

²⁸ Mittler, *Codex Manesse*, p. 229. Digital facsimile: *Codex Manesse*.

²⁹ Schubert 'Stifterstandbilder', pp. 427–37; Krohm and Kunde *Der Naumburger Meister*, p. 985. Other monuments with relevant sword depictions: Statue of St Reinoldus, fourteenth century, church of Saint Reinoldi in Dortmund, see Brandt, 'St. Reinoldus'; monuments for donators Gottfried and Otto von Cappenberg, dated 1320/30, Cappenberg collegiate church, see Seibt et al., *Vergessene Zeiten*, pp. 130–32, cat. no. 135; statue of St George, Chartres Cathedral, porch of the southern transept, see Niehr, 'Skulpturen', pp. 105–6; tomb slab for bishop Siegfried III. von Eppstein († 1249), Mainz Cathedral, see Niehr, 'Skulpturen', p. 109, fig. 11.

³⁰ Personal note from Gude Suckale-Redlefsen, Berlin, December 2009.

³¹ Becker and Schmauder, 'Hochmittelalterliches Schwert'.

TABLE 1: Comparison of morphologically related swords in European collections.

*Blade incomplete, tip is missing. The quoted data refers to the remaining parts.

Object	Sword, Bonn inv.: 19/2005	Sword, Cologne inv.: RM 1939/152	Sword, London inv.: 7775	Sword, Copenhagen inv.: D 105/1996	Sword, Zurich inv.: 3071
Overall length, cm	103	100	127.3	112.5	(92*)
Blade length (guard to tip), cm	82.7	80.9	100	93.1	(72.2*)
Blade width (quillon block), cm	5.6	6	6.7	5.3	5.5
Blade width (middle section), cm	4.6	4	4.5		4.5
Fuller length, cm	c. 45	71.5	56.5	66	66
Weight, g	1530		2060		
Marks	Yes, shape of a cross	No	Yes	Yes, "S"	Yes, shape of a cross
Inlaid mark, material	Blade: brass inlaid mark, cross shaped (order of Saint John)	No	Blade: brass inlaid mark, shape of a dagger. Pommel: brass inlaid mark, cross shaped	No	Blade: brass inlaid mark, cross shaped
Grip length, cm	13.6	18.5	20	17.5	20
Guard width, cm	18	21.2	21.6	20.2	22.5
Guard height, cm	0.9	0.9	1.8		0.8
Pommel type	Wheel pommel	Wheel pommel	Wheel pommel	Wheel pommel	Wheel pommel
Material of the pommel	Brass	Iron	Iron	Iron	Iron
Pommel width, cm	5.3	5.4	6	5	5.5
Pommel height, cm	4.7	5.4	5.2	5	4.8
Pommel thickness, cm	4.5	4.1	5	4	4
Circumstances of the find	River find	Unknown	River find	River find	River find
Dating	Late 13th – early 14th century	Late 13th century	Late 13th – early 14th century	1225–1275	1250–1350

The Highest Art of Smithery

Research on a Tyrolean Sword

Florian Messner and Ulrike Töchterle

IN CONTRAST TO THE armour of the Middle Ages and early modern era, which has been comprehensively and accurately researched in terms of art history, little attention has been paid to the study of edged weapons in Tyrol. Due to this research gap, it is possible to conduct fundamental research on a subject which, owing to the current enthusiasm for the Middle Ages, fascinates almost everyone: swords.

During the medieval period, the historical County of Tyrol was especially renowned for its plate armourers, gunsmiths, and their casting abilities. By contrast, few swordsmiths are known, an exception being Hanns Summersperger from Hall in Tyrol.

This article highlights one particular find: a hand-and-a-half sword (Oakeshott XVIIIb) that was discovered by archaeologists in 2013 in a grave of the parish church of Landeck (Tyrol). The well-preserved sword probably once belonged to Oswald von Schrofenstein (died 1497), a local aristocrat and founder of the late gothic section of the parish church.

During the late medieval period, the historical county of Tyrol was famous for its plate armourers, the best-known of whom is Konrad Seusenhofer, who made some very fine armour for Emperor Maximilian I and also for King Henry VIII of England. Additionally, some of the most capable bronze founders of the time, like the Löffler family, also resided in Innsbruck, the capital of the county. They did not just cast bells and statues, but also the formidable and effective artillery of Emperor Maximilian I. With these terrifying siege weapons, the Emperor conquered the fortresses of his enemies, such as at the siege of Kufstein in 1504.

These areas and their master craftsmen were researched comprehensively in the nineteenth and twentieth centuries from an art historical standpoint. By contrast, until now, historians knew of only one blade smith. His name was Hanns Summersperger and he lived in Hall, Tyrol. He forged swords, knives and other weapons for Emperor Maximilian I, and his best-known masterpiece is a ceremonial sword which is kept among the Imperial Regalia in Vienna today.

The field of edged weapons has paid little attention to Tyrol. The PhD project of Florian Messner aims to close this research gap by conducting fundamental research on the swords of this region. This article highlights a particular Tyrolean sword, which was discovered by archaeologists in a grave in the church of Landeck (Tyrol) (fig. 1).



FIG. 1: The grave of Oswald von Schrofenstein in the parish church of Landeck.

When researching the production of swords in medieval Tyrol, we focus on the tenth to the fifteenth centuries, a time when Tyrol was established as an autonomous county. The first known ruler was Bishop Albuin of Brixen, who died in 1006.¹ The other end of the chronological range is represented by Emperor Maximilian I (1459–1519), the most important member of the Habsburg family with regard to the history of Tyrol.

Maximilian not only often resided in the royal palace in Innsbruck, but was also a patron of the arts and crafts. While living in Innsbruck, he was involved in world politics and laid the foundation for an empire on which the sun never set. Maximilian also promoted the armaments factories in Innsbruck, especially the armourers' workshops in Mühlau.² It was here that Konrad Seusenhofer manufactured the most well-known harnesses of the time.

Maximilian was also an admirer of blacksmithing and especially blade smithing, as can be seen in his literary works such as the *Weißkunig* or *Theuerdank*. In Hall in Tyrol, about 10 km east of Innsbruck, the knife and swordsmith Hanns Summersperger produced numerous

¹ Riedmann, 'Das Mittelalter', pp. 280–83.

² Today a district of Innsbruck.

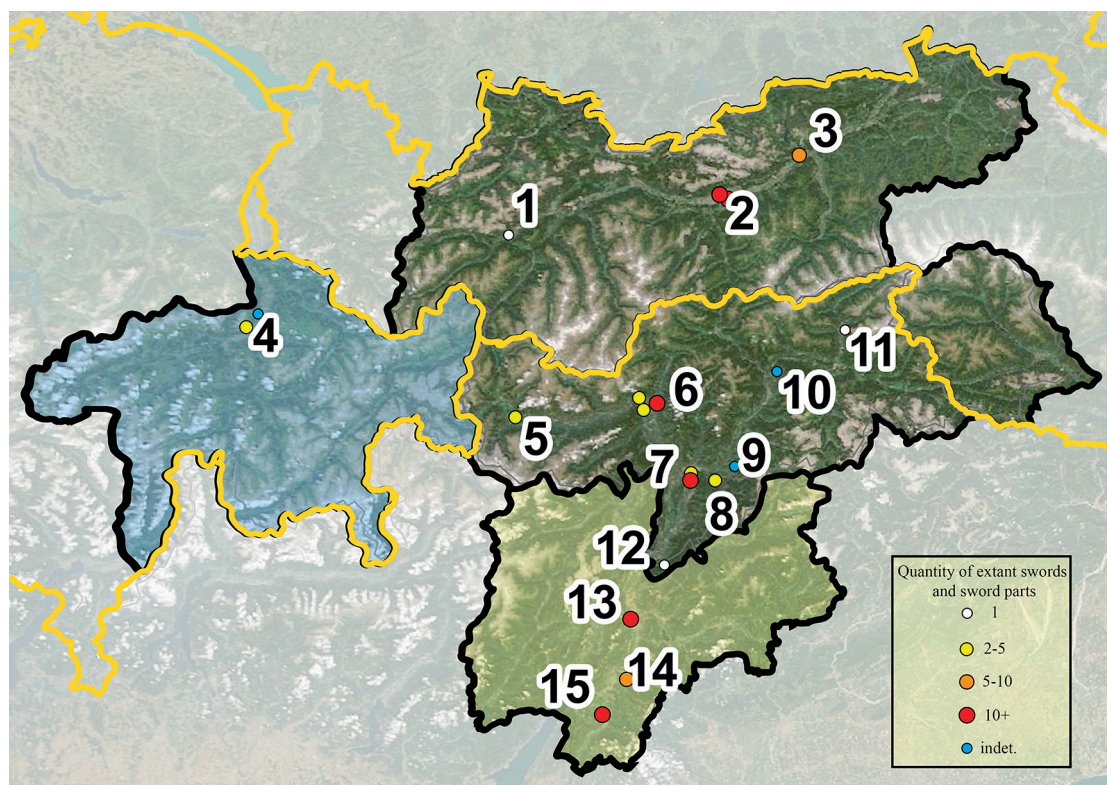


FIG. 2: Distribution of extant swords and sword parts in the investigation area, state of research March 2016: 1 Landeck: parish church, 2 Innsbruck: Museum Zeughaus and Castle Ambras, 3 Castle Tratzberg, 4 Chur: The Raetian Museum/Archäologischer Dienst Graubünden, 5 Churburg Armoury, 6 Meran: Landesmuseum Schloss Tirol, Landesfürstliche Burg, Castle Schenna, 7 Bozen: City Museum, depot of the cultural heritage preservation, 8 Castle Karneid, 9 Castle Prösels, 10 Castle Rodeneegg, 11 Castle Taufers, 12 Montan: private collection, 13 Trento: depot of cultural heritage preservation, Castle Buonconsiglio, 14 Castle Beseno, 15 Rovereto: War Museum.

high-quality blades for the emperor during the 1490s, some of which are still preserved today (see below).

The region of focus is the historical County of Tyrol, known in German as *Alttirol* at the end of the reign of Emperor Maximilian I. The historical region is now divided between three countries: Austria, Italy and Switzerland. So far it has been possible to establish the existence of about eighty to ninety medieval swords and sword parts, and this number is still growing (fig. 2).

Several problems came to light during the course of research. The first concerns the incomplete records of the swords' origins. Even in excellently managed museums, many of the weapons were acquired during the nineteenth and twentieth centuries, and the provenances

of their swords are no longer known. That is why many swords today are, figuratively speaking, situated in a vacuum.

Another serious problem is authenticity. Counterfeits of originals are not only a product of the present day. In the so-called “historicism”, at the end of the nineteenth century, it became fashionable to recreate medieval armour and weapons. Craftsmen not only forged new objects, but also combined old and new pieces, sometimes very skilfully. A sword from Castle Taufers in South Tyrol is a perfect example:³ it looks like a strange patchwork hand-and-a-half sword with a low-quality blade from the late nineteenth century which imitates a rapier from the seventeenth. The flimsy grip and pommel, which are clearly inappropriate for this type of weapon, also date to the nineteenth century. The only original part is the guard, which derives from a hand-and-a-half sword from around 1500.⁴

BLADE SMITHS IN TYROL

The matter of blade smiths in Tyrol is problematic. It has only been possible to identify one blade smith who had a smithy in Tyrol: Hanns Summersperger from Hall, active in the 1490s; hopefully more can be found in the archives. From this period we have some references to his work, such as a contract requesting payment from Emperor Maximilian I: “[...]dem Hans Summersperger, Messerschmied zu Hall, für etliche Schwerter und Messer 32 flRh zu bezahlen und ihm weiters 10 Bäume oder Holzstämme für den Bau seiner Schmiede zu geben”.⁵

His extant works are four hunting swords, ten hunting knives and some sets of hunting cutlery, distributed in collections in Europe and North America. His most noted work is the ceremonial sword (*Prunkschwert*) created for Emperor Maximilian I, which is richly adorned with *Goldschmelz* and today kept among the Imperial Regalia in Vienna.⁶

A LATE MEDIEVAL SWORD GRAVE FROM TYROL (AUSTRIA)

The so-called “Schrofenstein” sword will serve as an example for the approach regarding the documentation and evaluation of swords from Tyrol. This weapon is a rare example from an excavation in a church,⁷ where not just a sword was discovered, but also its owner.

³ Messner, ‘Clad for Conflict’, pp. 51f, pl. 4.

⁴ Seitz, *Blankwaffen I*, nos 43 and 45.

⁵ Maximilian I to Leonhard von Völs, 6 April 1497, Source: *Regesta Imperii*, RI XIV, 2 n. 4856. Translation: to give 32 flRh [goldcoins] to Hans Summersperger, cutler in Hall, for several swords as knives, as well as 10 trees or logs for building a smithy.

⁶ For more information, see image database of KHM.

⁷ Other graves containing swords in Tyrol were discovered in Bozen (Dominican church) and Mariatal (crypt of the Freundsberg-family). These swords will be examined in Florian Messner’s PhD thesis.

The discovery of the skeleton and the sword

In 2012 and 2013 archaeological investigations were carried out by the Talpa⁸ excavation company on behalf of the Federal Monuments Authority Austria as part of renovation work carried out on the parish church Mariä Himmelfahrt in Landeck (Tyrol). The church is located in the southeast of the city of Landeck, in the Angedair-Öd district, not far from Castle Landeck.

During the excavations, it was possible to identify five previous buildings, the oldest of which dates back to the early Middle Ages (fifth century). In addition to these sensational architectural remains, more than one hundred and fifty inhumation burials were found in the church, one of which was particularly noteworthy. Beneath the gallery in the southwest, exactly on the central axis of the side aisle, a burial that contained a sword, spurs and a rosary was discovered (fig. 3).⁹

The skeleton has a height of about 1.75 m and, oddly, has only one leg. The whole left leg, including all of the small foot bones, is missing. This suggests the subsequent translation of the remains from an elevated tomb to an earthly grave.¹⁰ To the left of the missing leg lies a 1.24m longsword. In addition to the sword, the deceased also had a pair of spurs at the right foot.¹¹

The skeleton's identity is not proven beyond doubt, but a probable assumption is that it is that of Oswald von Schrofenstein, who belonged to a very powerful family in this part of Tyrol. This family had their seat in Landeck and resided in the castle of the same name, whose picturesque ruins are still preserved on the mountainside north of Landeck.¹²

In addition to his judicial functions, Oswald was a noted patron of the parish church in Landeck. It was he who was mainly responsible for the construction of the current late gothic church. Oswald died on 3 January 1497 and was buried, according to written sources, in the newly built side aisle. The funeral shield of Oswald and his tomb slabs are still preserved in the church, but are now attached to an inner wall.¹³ Nothing else was preserved of the former grave.¹⁴ Thus, Oswald's grave was forgotten and no one knew its exact location until 2013.

The recovery and restoration

During the excavation of the tomb of Oswald von Schrofenstein, it was decided to recover and restore the grave goods at the restoration workshop of the Institute of Archaeology at the University of Innsbruck. The objects were in a very fragile state due to the different material

⁸ Senfter, 'KG Landeck'.

⁹ Ibid.

¹⁰ For further information regarding the burial rites, see: Schmitz-Esser, *Leichnam*.

¹¹ Senfter, 'Endbericht Ausgrabungen', p. D4327.

¹² Fritz, 'Landeck'.

¹³ For further information regarding the Oswald's funerary objects see: Köfler and Schmitz-Esser, *Inschriften Imst, Landeck und Reutte*.

¹⁴ Fritz, 'Landeck'.

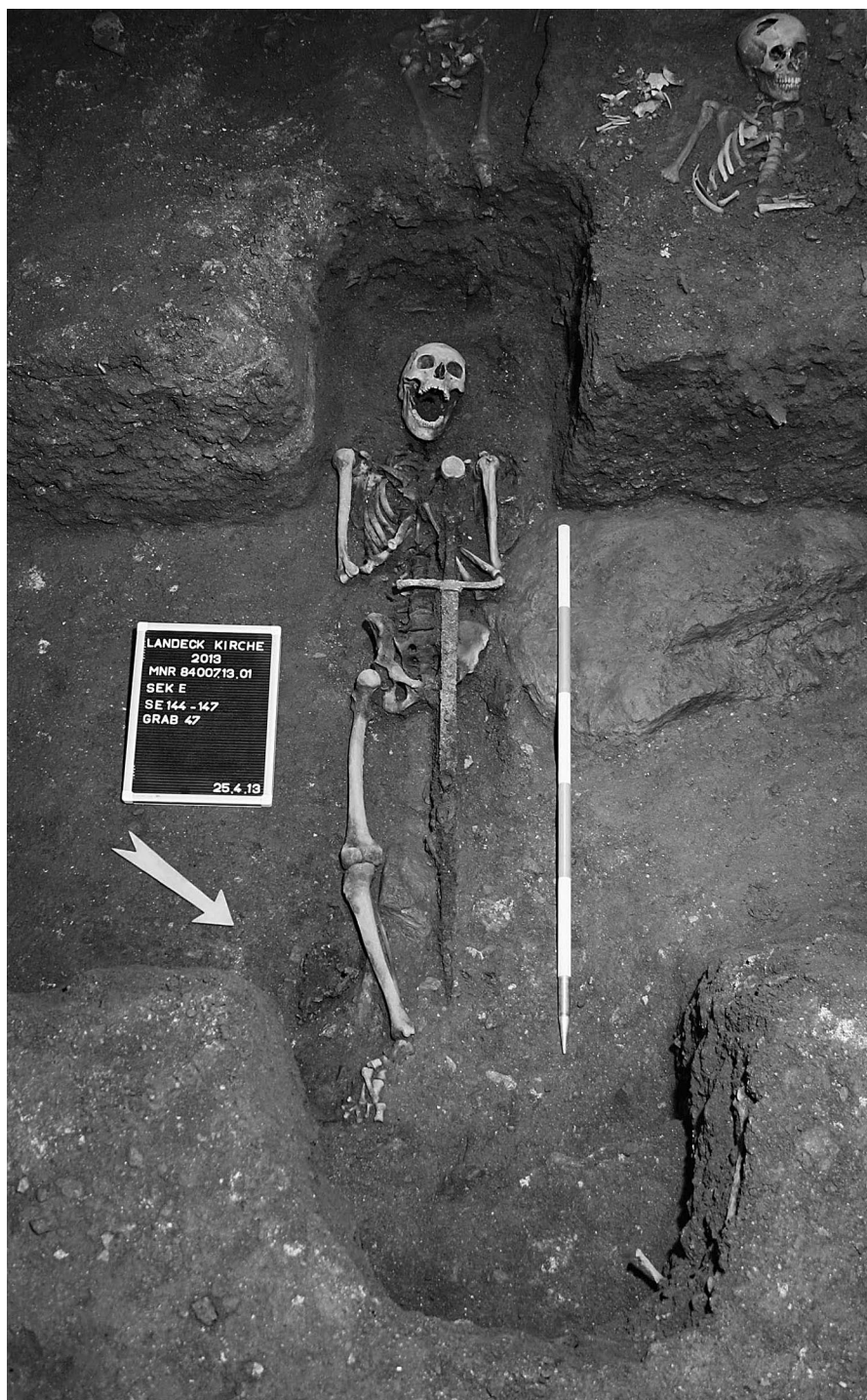


FIG. 3: Grave 47 in the parish church of Landeck, which contained the mortal remains of Oswald von Schrofenstein (died 1497) and his sword.

compositions and corrosion. Using the temporary binder cyclododecan,¹⁵ the artefacts were lifted from the excavation site as gently as possible. Before restoration, the sword was stored in a nitrogen-filled polyethylene bag to prevent further post-excavation corrosion, especially on the already heavily corroded blade. After extensive documentation of the conservation status (fig. 4), the very fragile and loose organic wrappings on the hilt were uncovered and stabilised (fig. 6). They consisted of a coarse double twine. Due to the efflorescence of the iron tang underneath, the condition of the wrappings varies greatly, as does that of the wood. In a further step, the pommel and the guard were mechanically freed from the green and bluish chloride corrosion layers (figs 4 and 5). An X-ray examination was conducted at the University Hospital in Innsbruck.¹⁶ It was discovered there that the iron blade was heavily corroded and that the iron core was very thin. The corrosion left severe marks on the iron, such as the formation of cracks, hump-shaped blooms of various iron oxides and hydroxides, and a lot of flaking.

For reasons of conservation, it was decided to desalinate the blade using a cold alkaline sulphite bath to stabilise harmful akaganeite.¹⁷ The blade was placed in a plastic tube filled with desalination solution; the copper alloy guard was protected with silicone from the strong liquid and vapours.

Following six months in the desalination bath, a sandblaster and micro cutter were used to carefully mechanically uncover the (partially very well preserved) original surface under the stereomicroscope.

After completion of the restoration work, the sword and the grave goods are now exhibited in the parish church of Landeck.

The sword as an object

According to the Oakeshott classification system, the Schrofenstein sword is a type XVIIIb weapon, which is defined as a very long slender sword, often with a reinforced tip. The grip, with a length between 25 and 28cm allows for the use of the weapon with both hands. Due to its low weight (1.4–1.5 kg) it can also be used with just one hand, especially if wielded on horseback. The shape of the grip is very characteristic and is dominated by a thicker lower half. The transition is often accentuated by a wide cross-rib. The cross-section is usually flat and diamond-shaped.¹⁸

This perfectly describes the Schrofenstein sword: it is 1.24m long, with a diamond-shaped cross-section, a long hilt, a round wheel-pommel (Oakeshott type G), and a curved guard (Oakeshott type 12).

There was no evidence of a scabbard. The dead man was therefore buried with the naked sword.

¹⁵ Material safety data sheet, online: <http://www.kremer-pigmente.com/media/files_public/87100_SHD_DEU.pdf>, accessed 16.05.2016.

¹⁶ Thanks to Peter Fiechtner from the Radiology Department at University Hospital Innsbruck.

¹⁷ Solution 2 % NaOH/ 6,3 % Na₂SO₃; Greiff and Bach, *Eisenentsalzung*.

¹⁸ Laible, *Das Schwert*, p. 105; Oakeshott, *Age of Chivalry*, pp. 70f.



FIG. 5: The pommel of the Schrofenstein sword from Landeck (front side) with the incised inscription.

The pommel

The pommel is in the form of a flat wheel with slightly rounded edges (Oakeshott type G). It measures 53mm in diameter and 21mm in thickness. It was cast in brass¹⁹ and subsequently engraved. The pommel has an incised inscription on the front: two circles frame the letters “IHS” (fig. 5). The circles were executed with some kind of compass, because there is a puncture still visible at the centre of the pommel, situated in the letter “H”. The three letters form the inscription “IHS”, the most common monogram or *nomen sacrum* for Jesus Christ. Looking at the grooves, it is probable that at least three engraving tools were used for the decoration of the letters; a straight one, a slightly curved one, and an almost semi-circular one.

The letters are highlighted by roughened gaps between them. A punch with a single point was used for the embossing, since the intervals between the single dents are very irregular.

The back of the pommel is plain (fig. 4.1) with a typical cast copper alloy surface, with the exception of an isolated, irregular shaped notch in form of a “J” with a small area of iron rust around it. The iron rust, which does not derive from the tang, suggests there could have been an iron pin to secure the sword during the effusion of the pommel with lead. But it is also possible that the craftsman first tried his tools on the back of the pommel before he dared to begin the decoration of the front.

¹⁹ EDRFA-analysis by Joachim Lutz, Curt-Engelhorn-Zentrum Archäometrie gGmbH Mannheim.



FIG. 6: Side (A) and reverse (B) of the hilt with details: 1–2 the Turk's head knot; 3–5 the wrapped surface with doubly twisted yarn.

The hilt

Due to the good preservation of the sword, it was possible to observe the composition of the 24.6cm long hilt. The iron tang is surrounded by a layer of beech.²⁰ The wood is wrapped with double-twisted plied yarn, made perhaps from flax or hemp (fig. 4).

The connection between guard and pommel is executed with an interwoven decorative knot-binding, the so-called “Turk's head knot” (*Türkenbund*) (fig. 6.1–2). In the centre, the hilt widens slightly and tapers towards the ends, so that both hands have a good gripping surface. The half nearest the blade seems to be a bit thicker, which perfectly matches other XVIIIb swords.

²⁰ Analysis by Andreas Heiss, Institute of Botany (Univ. Vienna) and Vienna Institute for Archaeological Science (VIAS). See also Heiss, ‘Die Buche im Griff’.

Although the organic components were in good condition, no traces of leather were discovered. A leather covering, as seen on the famous XVIIIb sword from Munich (see below), is therefore excluded.

The guard

The 22.5cm wide guard, also of brass, is very interesting (figs 4.2 and 7). It is slightly curved, with a floral pattern incised with the same technique and tools as the pommel. Like the pommel, it is only decorated on the front side, while the back is plain. The ends of the guard are adorned with a geometrical ribbon.

Also important is the central part of the guard. It consists of a sort of rain-guard or “chappe”, which is very rare because most surviving pieces are made from leather, as seen on the sword from Munich (see below). The copper alloy mimics a leather chappe rather closely, with the tubular “body” and the tongue-like extensions from the grip-leather forming the typical V-shape.²¹ The rain-guard consists of a tube, which is slightly broader than the blade, and has cast geometrical decoration in the shape of an arrow. The decoration on the reverse side is not completely identical, but of a similar style.



FIG. 7: The guard of the sword, front and back.

The blade

The original surface of the blade was carefully exposed by removing the extensive overlying layers of corroded iron; in several parts of the blade fine file marks could still be seen.

About 11–12cm below the guard, fragmented inlay marks were found on both sides (see below). At various points, it was possible to observe mineralised tissue residues in a tabby weave (figs 4.3 and 4.5). These are the sole remnants of Oswald von Schrofenstein’s funeral

²¹ We would like to thank Peter Johnsson, Uppsala, for kindly bringing this to our attention.

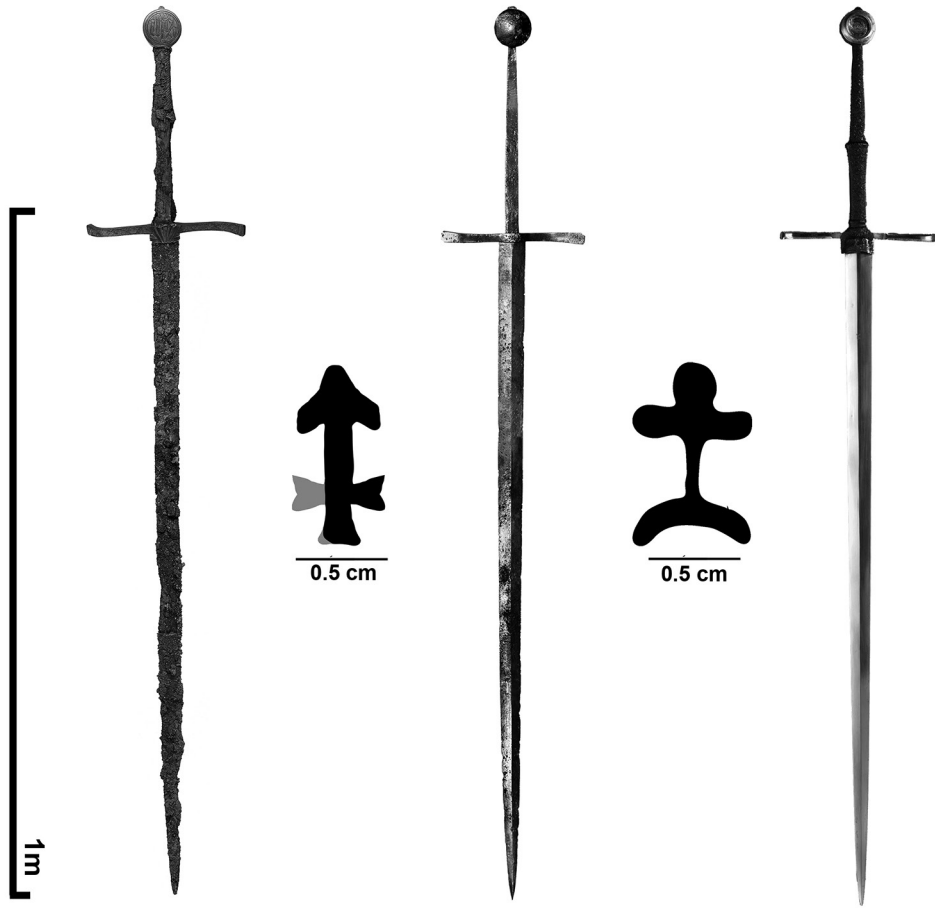


FIG. 8: From left to right: The “Schrofenstein” sword, the sword from Museum Zeughaus and the sword from Munich, all in the same scale. Between them the inlaid marks (left: from the “Schrofenstein” sword; right: from the swords in Innsbruck and Munich).

gown. There were also many remains of insect larvae, deriving from the decomposition of the corpse (fig. 4.4).²²

An XVIIIb connection?

It seems that there are other swords in the region that are surprisingly similar to the “Schrofenstein” sword. It was possible to identify two nearly identical swords, typologically

²² Samples will be examined by a forensic entomologist to determine more about the burial time and rites.



FIG. 9: The “Schrofenstein” sword after restoration was completed.

speaking. One is kept in the Zeughaus Museum in Innsbruck (W315, probably from Obertilliach/East Tyrol, Austria), and the other in the Bavarian National Museum in Munich (W872). The latter originally derives from Castle Ambras near Innsbruck.

They are all Oakeshott Type XVIIIb swords of nearly the same size, with the same proportions, curved guards, and similar cross-sections in the form of a flattened diamond and a round pommel (fig. 8 and table 1). The sword from the Zeughaus Museum has some inlaid marks in brass on the blade, which are very similar, if not identical to the sword from Munich.²³ They show a Latin cross on a hill, probably a depiction of the cross of Golgotha, where Jesus was crucified.²⁴ The inlaid mark on the “Schrofenstein” sword is a combination of an arrow and a Maltese cross. Although the marks are not identical, the technique and material used show many similarities.

Of course there are differences between them as well. The sword from the Zeughaus Museum seems to be a warrior’s weapon; simple with no decoration, but an effective and high-quality piece of craftsmanship nonetheless. The famous sword in the Bavarian National Museum in Munich probably belonged to a wealthy nobleman, as implied by its exquisite decoration. The display of Mary and the pious inscription “*o maria bit vir vns*” (o Mary, pray for us), brings the “Schrofenstein” sword to mind, which has “IHS” engraved on the pommel. Unlike the other two, the sword from Landeck has a pommel and a guard made from brass.

TABLE 1: Comparison of the most important dimensions of the three swords from Landeck, Innsbruck and Munich.

	Schrofenstein	Innsbruck (W315)	Munich (W872)
Length total (cm)	123.0	123.5	124.5
Width guard (cm)	22.5	19.7	22.4
Length hilt (cm)	24.6	25.3	25.8
Length blade (cm)	91.6	91.0	94.5
Balance point (cm)	8 from guard	9 from guard	9 from guard
Weight (kg)	1.45	1.45	1.46

CONCLUSION

The sword from the grave in Landeck is a good example of how archaeologists and conservators can work together. The identification of the deceased as Oswald von Schrofenstein is based on historical evidence; the archaeological situation (a burial in a prominent position in the aisle of the church, the still extant funeral shield and two funeral plates, as well as the presence and nature of the grave goods) also supports this theory. Since the grave did not contain any written evidence about the deceased and the elevated grave was removed long ago, the accompanying sword bears a special significance. This is because it is datable to

²³ Further investigations in Munich will support this theory.

²⁴ Thanks to Peter Johnsson, Uppsala, for kindly bringing this to our attention.

the second half of the fifteenth century, and also because it is the only sword in the church. Along with the spurs as an indication of the knighthood of the deceased, it seems plausible to assign the grave to Oswald von Schrofenstein.

Oswald was buried in 1497 according to the burial practices of his time; he was laid to rest in a pious manner in a linen funeral gown, with a rosary, and in a simple wooden coffin.²⁵ He took the insignia of his knighthood, however, to the grave, which is why today we are able to appreciate a centuries-old sword of remarkable craftsmanship.

Although the sword from Oswald von Schrofenstein's grave was manufactured very carefully, there are some indications that suggest that the weapon did not have a military use. A bronze guard and pommel are not particularly common. Although bronze is a tough metal, its hardness is certainly not as great as that of steel. Similarly, the decorations on one side only act as proof against the everyday use of the sword and more for a ceremonial one. Of course, it is also possible that an existing sword was re-hilted with a new guard and pommel for the funeral.

Be it a funeral sword, or one that Oswald had swung in battle, it is definitely an impressive example of sword making as the highest art of smithing.

ACKNOWLEDGEMENTS

Thanks to the parish of Landeck, Tamara Senfter, Harald Stadler, Peter Johnsson, Claudia Sporer Heis, Raphael Beuing, Nicole Mölk, Magdalena Nicolussi Castellan, Erica Hanning, Andreas Heiss, Peter Fiechtner, Joachim Lutz, and Johannes Pöll.

²⁵ For further information regarding the burial rites see: Schmitz-Esser, *Leichnam*.

III

Symbolic Meaning and Cultural Perception

The Battle for Glory

*Form and Function of Early Nordic Bronze Age Swords**

Jan-Heinrich Bunnefeld

IT IS LIKELY THAT in the Early Bronze Age societies of southern Scandinavia and northern Germany (c.1500–1100 B.C.) the sword was both the most important weapon and symbol in existence. Some of the various sword types were imports from elsewhere in Europe, while others were developed within this area, albeit influenced by other regions. Find contexts, production techniques, and use-wear indicate that these swords were elaborate products of metalcraft, used both as weapons against other humans, and as symbols of status or martial values in a decentralised, complex society. It is likely that the sword-bearers of northern Europe were mainly free farmers of unequal wealth and representatives of small and competing communities who engaged in frequent (violent) conflicts.

“The history of the sword is the history of humanity”.¹ Although this quote by Richard Francis Burton in his *Book of the Sword* does not tell the whole truth, in some societies the sword was supposedly so important that we have to study all of its facets – production, functions and its bearer/user – in order to gain a deeper understanding of its meaning. Since the early years of Bronze Age research in southern Scandinavia it has been clear that swords were prominent as weapons and symbols during the Early Nordic Bronze Age, leading to many researchers studying these various swords, albeit mainly from a typological perspective.² Since the 1950s, however, there is also an increasing number of studies on the swords’ technical and functional aspects.³

* This article is based on research conducted as part of the project “Technische Untersuchungen an älterbronzezeitlichen Vollgriffschwertern aus Dänemark und Schleswig-Holstein” (Technical research on Early Bronze Age full-hilted swords from Denmark and Schleswig-Holstein) under the direction of Prof. Dr. K.-H. Willroth (Georg-August-Universität Göttingen) and funded by the Deutsche Forschungsgemeinschaft (WI 691/19-1). The outcomes are published in detail in Bunnefeld, *Vollgriffschwerter*. I wish to sincerely thank all involved institutions and persons.

¹ Burton, *The Book of the Sword*, p. xv.

² Sprockhoff, *Griffzungenschwerter*; Ottenjann, *Vollgriffschwerter*; Quillfeldt, *Vollgriffschwerter*, pp. 45–94.

³ For typological studies, see e.g. Sprockhoff, *Griffzungenschwerter*; Ottenjann, *Vollgriffschwerter*; Quillfeldt, *Vollgriffschwerter*, pp. 45–94. For research history, see Bunnefeld, *Vollgriffschwerter*,

The Early Nordic Bronze Age dates to c.1500–1100 B.C., which is Period II–III according to Montelius.⁴ It is characterised by elaborate, sometimes excellent metal work, which often features distinctive forms and ornaments. These societies, however, were prehistoric, which means we do not have any written evidence and are totally dependent on archaeological sources for any research. According to these, people mainly lived in unfortified single farmsteads or small groups of neighbouring farmsteads. The populated landscape consisted of relatively open dry lands, between alternating wetlands and bogs, while other areas, like some parts of eastern Jutland and the interior of the larger Danish Isles, were apparently mostly unsettled forest.⁵ On average, unsettled areas included, the population density was between two and at most (although this is unlikely) five people per square kilometre.⁶ The farmsteads consisted of three-aisled longhouses of 10–60 metres, often with barns and byres inside, and in some cases adjacent buildings. The people were mainly farmers depending on agriculture and livestock, especially cattle.⁷ Ships, which are depicted in great numbers in Swedish and Norwegian rock-art and on some metalwork, were important for transportation not only along the small rivers, but especially on the coasts and between the islands. They seem very similar to the preserved pre-Roman Iron Age ship from Hjortspring in southern Denmark.⁸ People deposited objects in or near wetlands and bogs, most likely for ritualistic purposes. Often these depositions consisted of axes, but jewellery and other weapons like swords have also been found.⁹ Most swords, however, were certainly buried with their owners in the characteristic burial mounds. These barrows, which have diameters of 5–42 metres, are built of turves in the Scandinavian lowlands. They are widespread throughout the landscape and often situated in lines. The barrows, which are often comprised of several burials, contain men, women and some children.¹⁰ These burials likely represent the majority of the population, at least the free farmers and their families, although there has been some debate surrounding this issue.¹¹ Swords, daggers, dress adornments, jewellery, toiletries, and

pp. 19–23. Hundt, 'Produktionsgeschichtliche Untersuchungen'; Driehaus, 'Vollgriffschwert Niers'; Drescher, 'Vollgriffschwert Periode II'; Kristiansen, 'Krieger und Häuptlinge'; Wüstemann, 'Schwerver'; Bunnefeld and Schwenzer, 'Traditionen'.

⁴ Montelius, *Om tidsbestämning*; Kersten, *Nordische Bronzezeit*. See Hornstrup et al., 'Chronology', p. 48 table 1 (Period II: 1500–1330 B.C., Period III: 1330–1100 B.C.).

⁵ Jensen, *Bronzealder*, pp. 104–9, 340; Artursson, *Bebyggelse*; Holst et al., 'Herostrats', p. 24.

⁶ Bunnefeld, 'Häuptlinge oder freie Bauern', pp. 419–20. See also Zimmermann et al., 'Landscape Archaeology'.

⁷ Jensen, *Bronzealder*, pp. 104–24; Artursson, *Bebyggelse*; Bunnefeld, 'Häuptlinge oder freie Bauern', pp. 419–20; Holst et al., 'Herostrats', p. 24.

⁸ Kaul, 'Hjortspring Find'.

⁹ Willroth, *Hortfunde*.

¹⁰ For informations on Nordic Bronze Age burial mounds see most recently Holst, 'Barrows'. On their size see Endrigkeit, *Bestattungen*, pp. 25–38.

¹¹ Bunnefeld, 'Häuptlinge oder freie Bauern'.

FIG. 1: The Muldbjerg burial, Ringkøbing-Skjern Kommune, is an example of the well-preserved oak coffin graves from Jutland which confirm the assumption that swords are normally found in male burials (Inventory number B3332a mm, collection Danmarks oldtid, Nationalmuseet, Copenhagen).

tools are the most common objects found in graves, albeit not in fixed combinations, which could indicate different roles or identities.¹²

Although the skeletal remains are, in most cases, completely gone, it is often possible to determine the gender of the buried persons via the grave goods.¹³ Swords are thought to be male grave goods: this assumption is confirmed by, for example, the buried persons in well-preserved oak coffin graves from Period II (fig. 1).¹⁴ It is important to consider, however, that burials are not pure reflections of their society. They are constructed by the bereaved and influenced by ritual and religious and social aspects thus showing an ideal of the buried person.¹⁵ Nevertheless, they can give us a glimpse into society and its inherent inequalities.¹⁶ The different size of the barrows as well as the diverse number and quality of grave goods indicates the existence of social inequality and wealth differences in the Early Nordic Bronze Age.¹⁷

SWORDS AND SWORD-BEARERS

Unlike many other objects among grave goods, swords are most likely symbols of a particular social status. Different types of swords are known to have been used in the Early Nordic



¹² Steffgen, 'Gräber', pp. 184–92; Willroth, 'Krieger'; Thrane, 'Swords', pp. 500–1; Bunnefeld, 'Häuptlinge oder freie Bauern'. Contra: Kristiansen, 'Krieger und Häuptlinge'.

¹³ Holst, 'Barrows', pp. 94–97; Endrigkeit, *Bestattungen*, p. 44.

¹⁴ E.g. Jensen, *Bronzealder*, pp. 164–92; Holst, 'Barrows', pp. 94–97; Endrigkeit, *Bestattungen*, p. 44.

¹⁵ See e.g. Parker Pearson, *Death and Burial*, p. 84.

¹⁶ See e.g. Parker Pearson, *Death and Burial*, p. 84. Burmeister, *Späthallstattzeit*, pp. 99–100.

¹⁷ See e.g. Holst, 'Barrows', pp. 102–13; Bunnefeld, 'Reiche Bauern, arme Bauern'.



FIG. 2: Different sword types of period II from northern Europe: plate-hilted sword, flange-hilted sword, Nordic full-hilted sword, and octagonal-hilted sword. No scale.

FIG. 3: The Nordic full-hilted sword from Norby, Kreis Rendsburg-Eckernförde, was found in a richly furnished burial in a barrow, dating to period II. With its gold foil attached to the pommel plate and its overall good manufacture it belongs to the swords of the highest quality.



Bronze Age (fig. 2). On the one hand, there are swords with metal hilts (so-called full-hilted swords), and on the other there are swords with hilts or parts of the hilt made from organic material like horn or bone. Among the first group are the so-called Nordic full-hilted swords of periods II–III – genuine Nordic products evolving out of several mainly south-eastern European influences – and the octagonal-hilted swords of period II, imported from southern Central Europe.¹⁸ The second group comprises plate-hilted swords, flange-hilted swords and swords with rod tangs.¹⁹ Although difficult to measure, the swords within both groups show different grades of quality, whether in casting, elaborateness or materials of ornamentation. The most magnificent swords belong to the technically sophisticated and highly ornamented Nordic full-hilted swords (fig. 3). A clear difference between the highly ornamented full-hilted and simpler organically-hilted swords is, however, perhaps not so clear cut, as there are also examples of well preserved and ornamented organic hilts.²⁰

Similar to other elements of material culture, Bronze Age swords certainly had several meanings and functions, which are ambiguous, changeable and dependent on their individual context.²¹ Indications as to their social function as status symbols can be determined by their good visibility, economic value, exquisite craftsmanship, ornamentation, find context and a certain exclusiveness.²² The visibility of the swords inside or outside of their scabbards, whether at the belt or hanging from the shoulder, is obvious. Swords are among the heaviest Bronze Age metal objects, and in the north they were produced from bronze, all of which had to be imported.²³ The metallic appearance, sound, or “exotic” origin of the bronze could also have been significant in contributing to their function of conveying status; likewise the usage of rare ornamentation materials like gold or amber is remarkable (fig. 3). The crafting of a sword, including the occasional organic hilt, scabbard, belt and so on, was clearly time-consuming, complex and required the knowledge of several crafts.²⁴ The often unique ornamentation of metal hilts is a further argument for their social importance, although its former meaning is now lost.²⁵ More than 80% of swords with known find contexts are found in burials. Thus, it was apparently common to bury a man with his sword. Model calculations, based on assumptions of 1–10% of all Early Nordic Bronze Age swords ever existing being preserved and known, as well as on assumptions of population densities of 2–5 people per square kilometre, lead to the conclusion that 5–35%, most probably 10–20%, of all adult men might have been

¹⁸ Ottenjann, *Vollgriffschwerter*; Quillfeldt, *Vollgriffschwerter*, pp. 45–94; Bunnefeld, *Vollgriffschwerter*.

¹⁹ See e.g. Sprockhoff, *Griffzungenschwerter*; Bunnefeld, *Vollgriffschwerter*.

²⁰ Aner and Kersten, *Ringkøbing Amt*, pl. 31,4740 A.

²¹ Hahn, *Materielle Kultur*, pp. 122–28.

²² Burmeister, ‘Herren der Ringe’, pp. 276–77, 292; Hahn, *Materielle Kultur*, pp. 122–28.

²³ Bunnefeld, *Vollgriffschwerter*, p. 189.

²⁴ Jockenhövel, ‘Bronzen’, pp. 5–7, 11; Bunnefeld, *Vollgriffschwerter*, p. 189.

²⁵ Cf. Ottenjann, *Vollgriffschwerter*; Jockenhövel, ‘Bronzen’, pp. 5–7, 11; Bunnefeld, *Vollgriffschwerter*.

sword-bearers.²⁶ The evidence thus suggests that swords in the Early Nordic Bronze Age were often status symbols of free men with a martial identity who lived as free farmers, owners of their farmsteads, and patriarchs of their kin groups.²⁷

Closely connected to this is the notion that swords could have been mediums of cultural values and meanings. Of course, this is not possible to prove due to missing written evidence and their lost social context. Analogies from later periods, such as epics and sagas, however, make it possible to see (some of) them as representations of martial ideals and owners of famous names with biographies, magical qualities, or wills of their own. From an emic perspective, the sword might have been no object, but a “living” subject. Perhaps it was for this reason that they were placed beside the upper parts of their bearer in the grave, like some kind of companion.²⁸ Naturally, the practical function of the sword is closely entangled to, if not the basis for, its social function and symbolic meanings. The full-hilted swords in Denmark and Schleswig-Holstein are, on average, approximately 60cm in length and weigh around 600–700 grams.²⁹ Swords hilted with organic material have similar lengths and weights (considering the missing metal hilt). Despite seeming so, their hilts are not too short to be held. Including their broadened lower parts and excluding the pommel, they have an average length of 9cm while the median width of men’s palms today is 8.7cm.³⁰ Bronze Age swords are normally not supposed to perform powerful strikes but are quite well suited for cutting actions. All of them show two sharpened edges along the whole straight blade (fig. 4). Thus, a clear division between weapons for striking/cutting and thrusting is neither possible nor helpful, even if there might have been different emphases.³¹ Experiments on fresh pig carcasses show that bronze swords were suitable for cutting deeply through flesh up to the bone and thrusting through organic armour.³² Due to different re-sharpening patterns, Kristiansen has suggested that in period II more emphasis was placed on thrusting (narrow, thick blades), and in period III this emphasis shifted more towards striking/cutting (broad, thin blades).³³ While forms, cross sections and widths of the blades show no drastic changes, some re-sharpening patterns might point to such a shift, similar to contemporary developments in central Europe. In the north, the material used to produce the swords was tin-bronze with a content of approximately 10%

²⁶ Bunnefeld, ‘Häuptlinge oder freie Bauern’.

²⁷ However, they were not status symbols of a rather small “chiefly elite” (contra e.g. Kristiansen, ‘Krieger und Häuptlinge’). Thus, the situation is similar to the Viking Age with its many swords (Androschuk, *Viking Swords*, pp. 231–41).

²⁸ Kristiansen, ‘The Tale of the Sword’, pp. 329–31; Sørensen, ‘Identity’, p. 220.

²⁹ The standard deviations of the lengths are c.10–15 cm, depending on the sword type.

³⁰ Kristiansen, ‘The Tale of the Sword’, p. 320; Jürgens, *Erhebung*, p. 68; Bunnefeld, *Vollgriffschwerter*, p. 185.

³¹ Molloy, ‘Use-wear Analysis’, pp. 74–75; Mödinger, *Schwerter*, pp. 75–76.

³² Molloy, ‘What’s the Bloody Point?’, pp. 94–98, 106; Molloy, ‘Use-wear Analysis’, pp. 74–75; Mödinger, *Schwerter*, pp. 75–76.

³³ Kristiansen, ‘Krieger und Häuptlinge’, pp. 188–95.

FIG. 4: The straight and double-edged bronze blades were likely cold-hammered at the edges. Most of the blade anomalies in the X-ray, especially those at the edges, are due to corrosion. Nevertheless, it obviously was not possible to cast the blades regularly without gas bubbles remaining inside (Inventory number MCDXXVI, collection Danmarks oldtid, Nationalmuseet, Copenhagen).

tin, making it suitable for functional weapons.³⁴ Apparently it was not possible to cast long and thin blades regularly without gas bubbles remaining inside (fig. 4). Nevertheless, these blades were obviously sufficient for their users. Tin-bronze allows for a good increase of hardness through cold hammering and occasional reheating. The important elasticity is difficult to analyse with archaeometallurgical methods, but most likely only the edges were reworked.³⁵ Apart from a very few examinations, this still has to be studied for the Nordic swords.³⁶

Generally speaking, in Period II the hilts were fixed to the blades by rivets. There are different possibilities for shaping the end of the blade which is put into the hilt (fig. 5). The blades of Nordic full-hilted swords end in plates, flanges or rod tangs, whereas in octagonal-hilted swords flanges are wedged into the hilt. In Period III the blades of Nordic full-hilted swords end in a rod tang fixed to the pommel, generally without any rivets. Altogether, the mounting of swords with metallic hilts as well as organic hilts can be considered suitable for functional weapons.

Who made these elaborate swords? It is not likely that every craftsman who could produce, for example, an axe would have been able to cast a complex object like a sword. It is likely that there was a differentiation between craftsmen according to their level of skill and the training they had received. Nevertheless, these highly skilled craftsmen also lived and worked in farmsteads, and were not full-time specialists, as indicated by the undifferentiated settlement structures and recent ethnographic analogies. The high variation between swords, even within the same type, indicates a relatively large number of “workshops”, each consisting of only a few people.



³⁴ Riederer, 'Ergebnisse'; Bunnefeld and Schwenzer, 'Traditionen', pp. 227–32; Bunnefeld, *Vollgriffschwerter*, pp. 185–86.

³⁵ Molloy, 'Use-wear Analysis', pp. 71 and 75; Mödinger, *Schwerter*, p. 29.

³⁶ Molloy, 'Use-wear Analysis', pp. 71 and 75; Mödinger, *Schwerter*, p. 29. Studies on swords from Lower Saxony and Schleswig-Holstein: Kaufmann et al., 'Dahlenburger Typ'; Hüser, 'Brarupholz'.

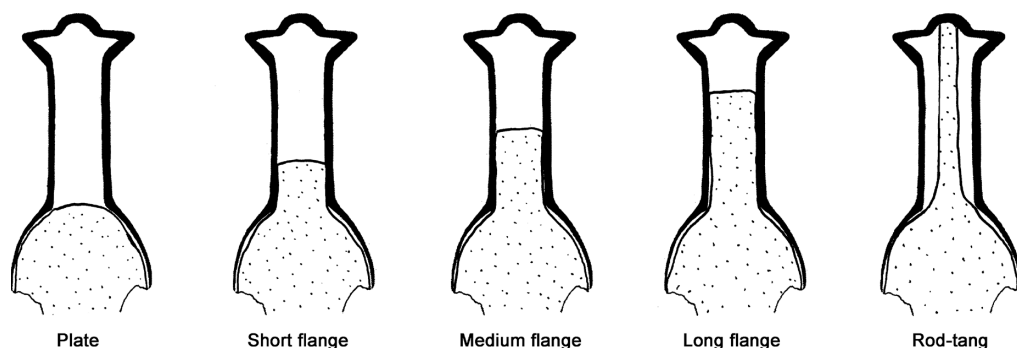


FIG. 5: Different blade ends of full-hilted swords. All variants are known in Nordic full-hilted swords of period II.

There might also have been itinerant craftsmen, working at different places, perhaps after their apprenticeship, but there is no evidence that the production of metal was wholly based on itinerant craftsmanship.³⁷

Even though Early Bronze Age swords were functional weapons enabling their bearers to fight other humans, we must look at the use-wear to see if they were actually used. Unfortunately, the swords discussed here are generally in a very bad condition, broken into several pieces and heavily corroded. As a result, it is impossible to detect any use-wear on many of the swords. Bronze Age fighters certainly knew the limits of their weapons, and therefore tried to avoid edge to edge contact.³⁸ That sword fighting did not usually include parries with the blade is also demonstrated by the lack of hand guards. Combatants likely used wooden or leather shields in order to prevent incoming attacks, as illustrated in rock-art pictures, which possibly also date to the Early Bronze Age.³⁹ Furthermore, minor edge damage was often repaired by hammering and is therefore not visible in the archaeological record.⁴⁰ Nevertheless, about 23–43% of the (few) full-hilted swords from Periods II and III, which were in a condition good enough to study this detail, have edge damage such as notches and nicks (fig. 6.1–3). In 4–12% of the well-preserved full-hilted swords from Periods II and III the blades are (mostly) slightly bent (fig. 6.4). The causes of this could be parries with the flat of the blade or thrusts against hard objects like shields.⁴¹ Re-sharpened blades are easier to identify, and re-sharpening at an intense level implies that the blade was seriously damaged (fig. 7).⁴² Such traces are observable in 25–31% of the sufficiently preserved blades from Periods II and III. Thus, there are no clear indications for functional differences

³⁷ Bunnefeld, *Vollgriffschwerter*, pp. 178–84.

³⁸ Molloy, 'Use-wear Analysis', pp. 76–77.

³⁹ Uckelmann, *Schilde*, pp. 137–41.

⁴⁰ Molloy, 'Use-wear Analysis', pp. 76–77; Siedlaczek, 'Nachguss', p. 118.

⁴¹ Hermann, 'Combat Experiment', pp. 31–33, and 61–62; Idem in this volume.

⁴² Thrane, 'Swords', pp. 495–96.



FIG. 6: Swords with edge damage (1–3) and a bent blade (4) (1–2, 4: Inventory numbers B844, B1, B11264, collection Danmarks oldtid, Nationalmuseet, Copenhagen; 3: inventory number K.S. 702, ALM Schleswig.).

between different sword types as suggested by Kristiansen.⁴³ Some of the worn-out hilts were discovered in bogs and therefore have faint or no ornamentation on the surface. About 20% of the hilts from Period II, however, which were in a good enough condition to study this detail, show that the decoration in parts stressed by handling had mostly been rubbed away (fig. 8). It remains to be discussed, however, whether the many damaged hilts of Period III were heavily worn-out, as Kristiansen suggests, or if their condition is instead related to corrosion of the very thinly-cast walls.⁴⁴ To summarise the above discussion of form, technology and use-wear, there can be no doubt that these swords were suitable for combat against other humans, and that they were indeed used for this purpose.

VIOLENT CONFLICT AND WARFARE

Due to a lack of written evidence, it is impossible to know who fought against whom and why this happened. Historical and ethnographic analogies show that the reasons are likely varied. A whole series of conflicts caused by land ownership, pasturage, cattle, resources, revenge, unfulfilled obligations, and harmful witchcraft are imaginable. We additionally ought to consider efforts to increase status, prestige, influence and last, but by no means least, plunder.⁴⁵ The deeper cause for war, however, defined as a planned and organised armed and violent conflict between independent political groups, also lies in the structure of the Early Nordic Bronze Age societies.⁴⁶ The archaeological evidence, with its relatively even distribution of burials, settlements and finds across southern Scandinavia and northern Germany, indicates a decentralised organisation: a complex network of many small, politically independent and competitive communities without a superior central power.⁴⁷ At the same time these communities were dependent on their land and cattle: locally concentrated resources which could not be left by their owners without experiencing a loss. Societies living under these conditions, with locally concentrated resources and in the absence of a central power able to secure peaceful conflict resolutions, often experience warfare between different communities, as documented in a detailed social anthropological study.⁴⁸ Although this does not seem completely inevitable, warfare is in many cases for such societies apparently a more effective strategy than peace. Under the threat of attack by other groups, which nobody else can prevent, each community must prepare itself by, for instance, having as many warriors or reliable allies as possible. Of course, this then threatens other communities and so on. This vicious cycle of threats frequently results in attacks on other groups whenever the

⁴³ Kristiansen, 'Krieger und Häuptlinge'; Thrane, 'Swords', pp. 495–96.

⁴⁴ Cf. Kristiansen, 'Consumption', pp. 161–63.

⁴⁵ Cf. Jockenhövel, 'Gewalt', pp. 118–20; Peter-Röcher, *Gewalt und Krieg*, pp. 57–58.

⁴⁶ Helbling, *Tribale Kriege*, p. 35. However, it is not possible to draw a clear line between war and other violent conflicts, like feuds within a political group, on the basis of archaeological sources. See e.g. Helbling, *Tribale Kriege*, pp. 37–45; Peter-Röcher, *Gewalt und Krieg*, pp. 14–26.

⁴⁷ Kristiansen, 'Rules of the Game'.

⁴⁸ Helbling, *Tribale Kriege*.



FIG. 7: Sword with intensively re-sharpened blade. The grooves on both sides of the blade rib have nearly completely disappeared due to re-sharpening (Inventory number B7722, collection Danmarks oldtid, Nationalmuseet, Copenhagen.).



FIG. 8: On several swords the hilt ornaments in parts stressed by handling have mostly been worn away (Inventory number K.S. 5662a, ALM Schleswig.).

circumstances seem in favour of a particular community, if only to avoid attacks by others in future.⁴⁹ Societies in which many weapons, like swords, are at hand are especially likely to appreciate (particular kinds of) violence, even if individual attitudes towards war might be more ambivalent.⁵⁰ We thus have to assume that many armed and violent conflicts took place in the Early Nordic Bronze Age.

Nevertheless, it is doubtful if permanent social roles like that of the warrior existed. While the swords in many male burials show the importance of a martial identity, there are no indications that a relevant number of men had a full-time occupation as warriors.⁵¹ It is more likely that a sword-bearer was a man with a particular social status, probably connected to an existence as a free farmer, while the role of warrior was one adopted temporarily as and when needed, although this does by no means imply a lack of training with weapons.⁵² Besides the sword, plenty of other weapons were used to fight against humans in the Early Nordic Bronze Age, most of them also used as tools or hunting weapons, including daggers,⁵³ axes,⁵⁴ spears, javelins,⁵⁵ clubs,⁵⁶ and bows.⁵⁷ We do not know of defensive arms and armour

⁴⁹ Ibid.

⁵⁰ Orywal, 'Krieg und Frieden', pp. 39–41; Helbling, *Tribale Kriege*, pp. 328–35.

⁵¹ Bunnefeld, *Vollgriffschwerter*, pp. 199–200.

⁵² Helbling, *Tribale Kriege*, p. 52; Bunnefeld, *Vollgriffschwerter*, pp. 200–2.

⁵³ Bunnefeld, *Vollgriffschwerter*, pp. 184–88.

⁵⁴ Willroth, 'Beile'.

⁵⁵ Jacob-Friesen, *Lanzenspitzen*; Bunnefeld, 'Lanzenspitzen'.

⁵⁶ Jantzen et al., 'Bronze Age Battlefield', p. 423, fig. 5.

⁵⁷ Thrane, 'Swords', p. 494; Thrane, 'Aggression', p. 18; Bunnefeld, *Vollgriffschwerter*, p. 205.

from the Early Nordic Bronze Age, but it is sensible to assume that armour and shields made from organic materials were used (see above); organic shields from the same time have been preserved in Ireland.⁵⁸

While the sword was the weapon most often buried with the dead and the most important symbol of male martial identity, combinations of melee weapons are found in graves from particular regions dating to Period II.⁵⁹ How the groups of warriors were organised, how large they were and which social groups they represented (whether certain lineages, kin groups or other social groups like retinues or fraternities) is not clear. The most prominent positions in such armed groups, however, were surely held by sword-bearers. Furthermore, it was the owners of golden arm rings, frequently associated with swords in male burials, who were men with a higher social status than the “ordinary” sword-bearers or with a special function in society.⁶⁰ According to the generally low population density and existence of unfortified scattered settlements, we can assume that warfare based on raids, ambushes and rather small, armed groups was the norm, probably often transported by fast ships.⁶¹ On occasion there might have been larger, even maybe pre-arranged, battles, as possibly represented by the remains discovered in the Tollense valley of Mecklenburg-Vorpommern.⁶² In conclusion, the sword served the free man both as a weapon and a status symbol in his efforts to keep or increase status, prestige and glory in the decentralised but hierarchical and competitive society of the Early Nordic Bronze Age. While other weapons were certainly suitable as a substitute for the sword as a weapon, its social and symbolic functions and meanings seem to have been as unique and of a special character.

⁵⁸ Uckelmann, *Schilde*, pp. 137–41 and 158–59.

⁵⁹ Cf. Steffgen, ‘Gräber’, pp. 174–76.

⁶⁰ Bunnefeld, ‘Reiche Bauern, arme Bauern’, pp. 250–51 and 257–58; Cf. Metzner-Nebelsick, ‘Ringe der Macht’, pp. 188–89.

⁶¹ Ling, ‘War Canoes’.

⁶² Jantzen et al., ‘Bronze Age Battlefield’. On raids and battles from an ethnographic perspective, see Helbling, *Tribale Kriege*, pp. 58–59.

The Iron Sword from the “Warrior’s Grave” in Lanuvium

Fabrizio Savi

IN 1934 A RICH burial dating to the beginning of the fifth century B.C. was discovered in Lanuvium, near Rome. The grave contained both sporting items (including a rare bronze throwing disc, three alabastra, strigils and a leather pouch) and high-quality weapons, with a refined bronze helmet and cuirass, likely of Etruscan manufacture, as well as an iron cavalry sword of the type usually called a machaira. It was the burial of a young wealthy horseman whose life was clearly focused on war and sport.

Some considerations follow regarding the use of different Greek terms for different types of swords, with references and examples from the main literary sources (from Homer to Xenophon and Caesar). Furthermore, the archaeological data suggests a trend in the evolution and diffusion of machirae/kopides in the Mediterranean area. All of these elements allow the author to propose a convincing match between the Greek terms and the different types of swords.

Also provided is a short description of the organisation of Roman cavalry in the sixth and fifth centuries B.C., to better describe the society in which the Lanuvium warrior lived.

LANUVIUM AND THE DISCOVERY

Lanuvium is a small town, about twenty miles south-east of Rome, in the area called *Castelli Romani*. According to legend, the ancient city was founded either by the Greek hero Diomedes, or by Lanoios, a Trojan friend of Aeneas, and was famous for the presence of the sanctuary of Iuno Sospita (favourable Iuno) and its agricultural rites (including the sacrifice of young girls to a sacred snake).

In the sixth century B.C. Lanuvium was a member of the thirty *populi* of the Latin League and participated in the insurrections against Rome, while in the fifth century B.C. it was often allied with Rome. It then changed sides again and participated in the last insurrection of the Latin League against Rome; in 338 B.C. the League was defeated and for a few years Lanuvium was downgraded from *municipium cum suffragio* to *civitas sine suffragio*, but its former rank was soon restored due to the importance of the sanctuary of Iuno Sospita.



FIG. 1: The contents of the grave. (Inv. no. 574335; Museo Archeologico Nazionale di Roma).

In January 1934, during the building of an irrigation structure in the area of Vigna Galiati (the site of a Roman villa located just outside of the ancient city), a stone sarcophagus placed in a wide (2×2 m) quadrangular ditch dug into the tuff was discovered.

The tomb was intact and no other burials were found in the area. The shape and type of the sarcophagus (similar to those found in the so-called "Athletes' graves" in Tarentum) and

its contents place the burial at the beginning of the fifth century B.C. The skeleton found in the sarcophagus was in fairly good condition and could be identified as a 25-year-old male.¹

Concerning the items found in the grave (it is interesting to underline the absence of pottery objects in the burial), a distinction should be made between the two sets of objects: sporting equipment and weapons (fig. 1).

THE SPORTING EQUIPMENT

In this first group, the most well-known item is a bronze sporting disc with incisions representing a disc thrower on the one side and a possible *desultor* (*apobates* in Greek) on the other (figs 2 and 3).

The style of the representation of the thrower can be considered as late archaic, while the horseman is represented in a less stiff posture dismounting from his horse. The *desultores'* exercises were of two types: running with two horses and jumping from one to the other or, what is probably depicted here, riding a horse in armour in the first phase and then dismounting and continuing the run (the Olympic *kalpe*).

The bronze disc is unique to Italy (iron discs with a practical use have been found in graves² but none made of bronze) and was probably a prize won in a competition. The manufacture of the item is Etruscan in style, as are the figures that can be easily compared to other Etruscan sources, such as in funerary paintings and on painted pottery.³

The remaining sporting items are two or three alabaster *alabastra*, at least two iron strigils, and a leather pouch for sand with its bronze belt. We have also one iron javelin point and two butt-spikes, or *sauroter* (Greek for "lizard killer"), that can be contextualised in both the sporting and the military environment. The same can be said regarding the wide leather belt covered by a thin bronze foil with round bronze studs (7cm wide and 56cm long). There is also an iron head of a spade or axe, the purpose of which is uncertain (a tool to improve the competition terrain?).

Before examining the weapons in detail, it is necessary to suggest a final consideration regarding the *desultor/apobates* figure: here we have a warrior, with helmet, spear, and muscle cuirass represented in the act of descending from his horse. The scene can be considered in three different ways: war versus sport (the horseman and the discus thrower), the two different activities of the dead, or two sporting activities (the thrower and the *desultor*) both dear to the dead man. The most relevant observation, however, seems to be that our main character was familiar with horses and went to war as a horseman, as the weapons analysis will demonstrate.

¹ Zevi, 'Tomba del guerriero', p. 132.

² Ibid., p. 420.

³ Ibid., pp. 420–22.



FIG. 2: The disc thrower.
(Inv. no. 360111 317480;
Museo Archeologico
Nazionale di Roma).

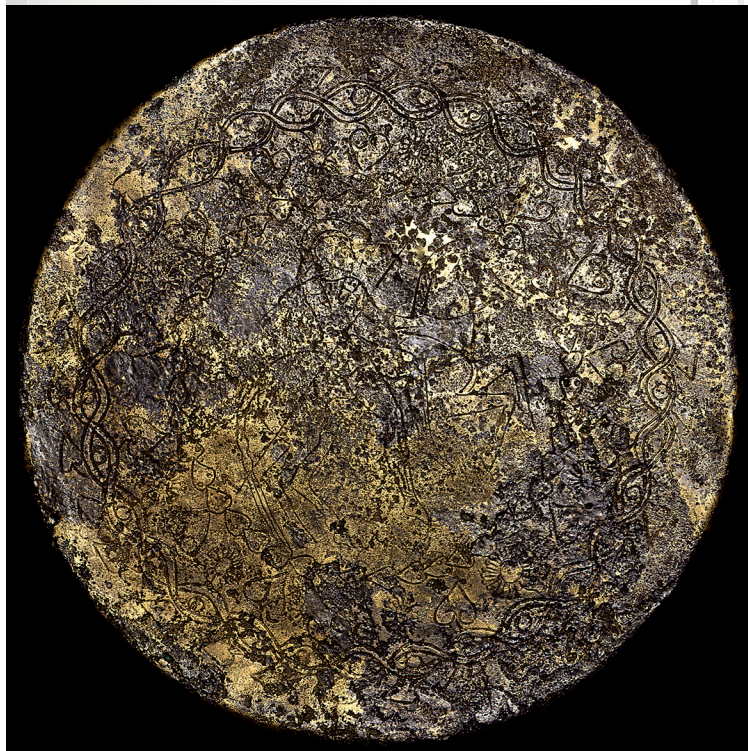


FIG. 3: The *desultor*. (Inv.
no. 360111 317480; Museo
Archeologico Nazionale
di Roma).

FIG. 4: The helmet. (Inv. no. 316936 360178; Museo Archeologico Nazionale di Roma).



THE HELMET AND THE CUIRASS

The helmet (16.4cm high and with a maximum diameter of 23.7cm) is bowl-shaped (it might be considered a parade item with characteristics derived from various types quite common to Central Italy since the beginning of the sixth century B.C. as Attic, Negau, and Montefortino) and richly decorated with the representation of a human face (figs 4 and 5), with eyebrows, eyes (made of two coloured glass pastes and probably of apotropaic nature, similar to those represented on some Attic *kylikes*)⁴ and nose; the presence of a circlet resembling a "victory crown" may perhaps be considered as a further connection to the sporting context. On top of the helmet we find two silver sea dragons to support the *lophos* as well as two lateral "wings" designed to hold the leather sheaths, into which long feathers were placed to 'increase' the warrior's height.

This open helmet is in line with Xenophon's recommendations who, in his treatise *On Horsemanship*, when mentioning the open Boeotian helmet stressed the need for a cavalryman to possess good all-round vision.⁵

Looking to other similar examples, the helmet should be considered of Etruscan make (possibly from Vulci, near the border between Latium and Tuscany). As a final consideration,

⁴ Ibid., p. 433.

⁵ Xenophon, *On Horsemanship*, 12.3.



FIG. 5: The helmet, front detail. (Inv. no. 316936 360178, Museo Archeologico Nazionale di Roma).

it is interesting to note how the tradition of the eyebrow decoration continued into at least the first century A.D., as with the Gallic Agen/Port and the legionary “imperial Gallic” or *Weisenau* type helmets,⁶ showing a truly remarkable temporal continuity.

The muscle cuirass was placed on the skeleton’s tibias and is another high-quality item; the bronze is particularly light and the construction and decorative details were made with the utmost care (fig. 6). When it was discovered, the leather and canvas lining was still preserved,⁷ but now only a little organic material is left.

The cuirass is 50cm long (including the shoulder guards) and 31cm wide, with the back plate shorter than the front (fig. 7); the dimensions and the shape seem to clearly indicate that it was to be used by an armoured horseman rather than an infantry hoplite. Indeed, the limited height, together with the shorter back plate, is related to the need to make the sitting position (on a horse) as comfortable as possible.

The production area for the cuirass can also be identified as one of the main Etruscan bronze manufacturing centres, again probably Vulci, by looking at other examples like those in the Museo Etrusco Gregoriano in the Vatican.⁸

⁶ Travis and Travis, *Roman Helmets*, pp. 58–65.

⁷ Zevi, ‘La tomba di Lanuvio’, p. 434.

⁸ *Ibid.*, p. 436.

FIG. 6: The cuirass. (Inv. no. 360113 360114; Museo Archeologico Nazionale di Roma).



FIG. 7: The cuirass, side view. (Inv. no. 360113 360114; Museo Archeologico Nazionale di Roma).



THE SWORD

The main weapon of the warrior, if not the only one, is a long, curved iron sword (fig. 8). In the relevant archaeological literature, it is almost always called a *machaira* and, for the moment, we will not make further comments on this Greek term. It is quite a heavy and long weapon (almost 90cm), with a closed guard (the missing fragment completing the guard has been only recently⁹ identified), and the grip was probably covered by wooden or bone elements attached with small iron nails (fig. 9).

This type of single-edged blade is well documented¹⁰ in Central Italy, particularly in Umbria and Picenum. From this latter area we have many examples and the weapon should be considered typical for the period between the sixth and the fourth centuries B.C. The longest items come from this region (almost 100cm), but we are still lacking a systematic study of their evolution and of the possible relationships to shorter specimens from the Balkan side of the Adriatic. Other swords of this kind, albeit in smaller quantities, have also been found in Latium, both in coastal Etruria and in Corsica (Aleria).¹¹

The Lanuvium blade must be considered a cavalry sword: its length, weight and balance make its handling by a foot soldier almost impossible. On the contrary, a horseman would have had a clear advantage¹² using this "sabre" to reach a running or crouching infantryman without risking the dangerous imbalance caused by the need to bend over the horse's side without the help of stirrups.

With reference to the strength of its strikes, the lack of stirrups would have also been partially compensated for by the weight of the sword, which would have reduced the need to rise from the saddle to increase the power of the cut.

In the Lanuvium grave no shield or greaves were found and this, by also looking to later painted scenes, fits with the identification of the dead as a horseman. For example, there is evidence in some painted Paestum tombs of armoured horsemen with no greaves or shields, although there are sources which demonstrate that infantrymen were provided with both.¹³ Greaves were probably impractical for cavalry, compromising the rider's grip and risking injury to the horse. The lack of a thrusting spear can be compensated for by the presence of the javelin point and butt-spikes, which represent a possible alternative.

SOME CONSIDERATIONS OF GREEK TERMINOLOGY

As mentioned before, the type of sword found in the Lanuvium grave is generally described as a *machaira* by archaeologists, even if it is recognised that the term cannot be considered

⁹ Ibid., p. 430.

¹⁰ Ibid. pp. 430–31.

¹¹ Quesada Sanz, 'Falcata ibérica', pp. 505–12.

¹² Zevi, 'La tomba di Lanuvio', p. 431.

¹³ *Enciclopedia dell'Arte Antica*, p. 157.

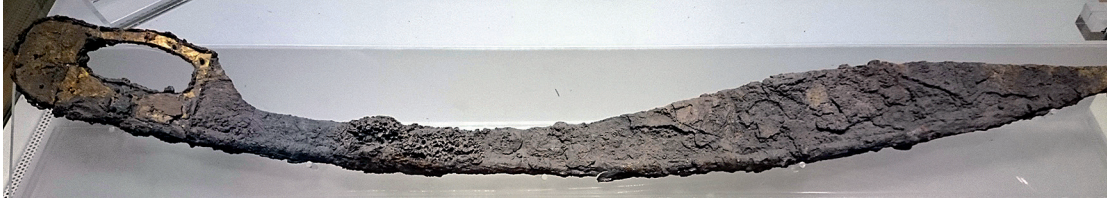


FIG. 8: The sword. (Museo Archeologico Nazionale di Roma).



FIG. 9: The sword; detail. (Museo Archeologico Nazionale di Roma).

correct or appropriate. Thus, it is important to try to categorise the use of Greek words for “sword”, even though the Greek authors themselves contribute to the general confusion.

Homer uses five names: *chalcos* (copper and thus equivalent to the Latin *ferrum*), *phasganon* (probably a dagger or dirk), *aor* (broad, stout long blade, mainly used poetically), *xiphos* and *machaira*.¹⁴

Of the last two words, *xiphos* is the easiest to interpret as the short, straight, double-edged sword typical of the Greek hoplites. It was mainly a thrusting weapon and, in a certain way, it anticipated the Roman *gladius* in its scope; we should keep in mind, however, that the main difference to the *gladius* is that the *xiphos* was a secondary weapon to be used only after discarding the spear. The Roman sword, on the contrary, was one of the elements central to the legionaries’ way of fighting. Archaeological remains of real *xiphoi* are very few, but in both the Greek and the Etruscan world we have a wide range of surviving representations¹⁵ in tomb paintings and Attic pottery.

The *Iliad*¹⁶ uses the term *machaira* to identify a kind of multipurpose knife kept near the scabbard of the sword (*xiphos*). This is perhaps something similar to the *kogatana*,

¹⁴ Burton, *Book of the Sword*, p. 222.

¹⁵ Everson, *Warfare*, p. 163; Sekunda, *Spartan Army*, p. 31.

¹⁶ Homer, *Iliad*, II, III 271.

the small blade which may be a part of a Japanese sword's *koshirae*, or to the *chakmak* and the *karda*, the two small knives kept in the back of a Gurkha *kukri* scabbard. It is used consistently through the *Iliad* to pull an arrow point out of a wound.¹⁷

Some centuries later, Herodotus¹⁸ used *machaira* with reference to both a kitchen knife and a dagger (used by Cleomenes for his suicide). Aristophanes, Aristotle and Euripides all use *machaira* as a sacrificial knife and there are also references¹⁹ to it having the meaning of surgical instrument.

There remains only one element about the *machaira* that can be considered probable with a great level of certainty: that it had a single-edged blade. This is compatible with the descriptions and references made by the aforementioned authors.

For the fourth century B.C. the main source for the terminology of arms is Xenophon and his well-known quote from his treaty *On Horsemanship*, which includes all the three main terms: "I recommend a *kopis* rather than a *xiphos*, because from the height of a horse's back the cut of a *machaira* will serve you better than the thrust of a *xiphos*".²⁰

We have to keep in mind that Xenophon was a military man and so we have to presume that he uses the right words, but while the quote from *On Horsemanship* seems to imply a relationship between *machaira* and *kopis* (or perhaps the fact that the latter was a sub-class of the first), in *Cyropaedia*²¹ he refers to them as if they were different weapons. In the same text Xenophon speaks about the *machairophoroi*, Thracians (see Curtius Rufus' quote with Thracians using *kopides* below) and Egyptians armed with huge spears and *kopis*.

Another historian proficient in military matters, Polybius,²² seems to use *machaira* as a general term for sword (even if he refers to the *machairai* of the Gauls as merely cutting blades, without a tip and fit only to slash downwards from a distance) and the same happens with Dionysius of Halicarnassus.²³ Finally, after the third century B.C., we find the Latin word *machaera* used with all the meanings that can be seen in the Greek evidence, from knife to sword.

In the Roman world, perhaps the most interesting quote is from Seneca, who reports an anecdote from Caesar who, after the battle of Munda, was not able to recognise one of his veterans due to the scars on his face; the soldier replied "*nec galeam illam, si videris, agnosces; machaera enim Hispana divisa est*".²⁴ The answer clearly seems to refer to a slashing cut inflicted with a heavy weapon which might be what, with a modern term, is generally referred to as a Spanish "*falcata*".

¹⁷ Homer, *Iliad*, II, XI 844.

¹⁸ Herodotus, *Histories* II, 41.

¹⁹ Quesada Sanz, 'Machaira, kopis, falcata', pp. 78–79.

²⁰ Xenophon, *On Horsemanship*, 12:11.

²¹ Xenophon, *Cyropaedia*, I, 2, 13.

²² Quesada Sanz, 'Machaira, kopis, falcata', pp. 82–83.

²³ Dionysius of Halicarnassus, *Antiquitates Romanae*, XIV, 10, 1–3.

²⁴ Seneca, *De Beneficiis* V, 24,2.

Finally, the interpretation of *machaira* as a single-edged blade seems to be confirmed by Isidore of Seville in his *Etymologies*,²⁵ where he states that "*machaera est autem gladius longus ex una parte acutus*".

To try and have a complete vision of this quite complicated landscape of terminology we now must specifically evaluate the term *kopis*. Returning to Xenophon's texts, he normally refers to the *kopis* as a foreign weapon used by the Egyptians and Persians. As we have seen, however, in *On Horsemanship* he refers specifically to the Greek world and the training of cavalry.

A specific and very interesting quote about the *kopis* is made by Curtius Rufus when, in the description of the battle of the Hydaspes,²⁶ he reports that Alexander sent his Agrianians and Thracians armed with *kopides* to attack Porus' elephants and then describes their weapons: "*Copidas vocabant gladios leviter curvatos, falcibus similes*". The *kopis* was capable of delivering a blow with the momentum of an axe, while maintaining the longer cutting edge of a sword, and was therefore the perfect weapon to cut the tendons of the elephants' rear legs.

Furthermore, we cannot forget, at least from an etymological point of view, the Egyptian *khopesh*; a type of sickle sword that probably evolved from battle axes and was quite common from 2500 to 1200 B.C. The blade of this weapon was only sharpened on the outside portion of the curved end. Generally, the origin of the Greek term *kopis* is considered to be related to the verb *kopto* (to cut, to strike), but a relationship with the Egyptian word cannot be excluded.

Finally, we should not forget that, even if they are not widespread, representations²⁷ of *machairae/kopides* are present in both reliefs and paintings from buildings and graves in the Etruscan area and in southern Italy.

Focusing on the Central Mediterranean area it seems possible to identify the following east to west trend for the geographical distribution and evolution²⁸ of the *machaira/kopis*:

- In the Balkans/Illyric region we find some very old (first half of the seventh century B.C.) and short (30–50cm) *machairae/kopides*;
- Moving from east to west, in the sixth century B.C., we have longer (up to 110cm) swords in central Italy, particularly in Picenum, Etruria, Latium and Corsica (Aleria necropolis). Most of these items were likely being used by cavalry;
- Later on (at end of the fifth century B.C.) in Spain we find again shorter *falcatas*, clearly infantry weapons.

Based on all of the considerations made above, it is possible to put forward a proposal for adopting a stable classification system for the different types of sword, including the sword from Lanuvium:

- Without any major doubts, the *xiphos* is the short, straight, double-edged sword typical of the Greek hoplites. It was mainly a thrusting weapon.
- The *machaira*, when considered a weapon and not a simple cutting tool, is a single-edged straight or very lightly curved blade, mainly a slashing sword. Due to its use it cannot be made too short.

²⁵ Isidore of Seville, *Etymologies*, XVIII, 6, 2.

²⁶ Quintus Curtius Rufus, *Histories of Alexander*, VIII, 14, 29.

²⁷ Quesada Sanz, 'Falcata ibérica', fig. 4–7, pp. 524–26.

²⁸ Ibid., fig. 14, p. 530.

- The *kopis* is a single-edged curved blade of varying lengths, the edge being concave to the part of the sword nearest the hilt, but swelling to convexity towards the tip, in this way increasing the “forward” balance. Mainly used by horsemen, the Lanuvium sword is a long example of this type of weapon. Shorter *kopides* were infantry weapons and may correspond to the sword generally called in modern scholarship a *falcata*.

ROMAN CAVALRY IN THE AGE OF THE KINGS AND IN THE EARLY REPUBLIC

Finally, a few words on cavalry in central Italy in the sixth and fifth centuries B.C. We know the situation in Rome quite well, and it can be taken as a reference model for other cities like Lanuvium, which was a member of the Latin League of thirty peoples.

Under Romulus (the first king of Rome, traditionally in the eighth century B.C.) were created three *centuriae* of knights, one for each tribe (*Tities*, *Ramnes* and *Luceres*). Under Tarquinius Priscus (the fifth king, early sixth century B.C.) their strength was increased to six hundred men.²⁹

The major reorganisation, however, took place during the reign of Servius Tullius (the sixth king). Service in the cavalry, divided into eighteen *centuriae*, was restricted to those citizens in possession of 100,000 *asses* or more, and who could furnish themselves with bronze helmets, round shields, greaves, spears and cuirasses. The state treasury granted each *eques* 10,000 *asses* for the purchase of a mount, while for the maintenance of the horses rich spinsters were obliged to pay 2,000 *asses* on an annual basis.³⁰ Thus, in the political voting system of *comitia centuriata* at the highest level there were the original six *centuriae* (*sex suffragia* titled *Tities priores* and *posteriores*, *Ramnes priores* and *posteriores* and *Luceres priores* and *posteriores*), plus the other twelve *centuriae* chosen among the leading citizens (*ex primioribus civitatis*).

Later, in the early Republican period, the Roman cavalry structure was changed and was organised by *turmae* of thirty men, each divided into three *decuriae*. As Rome defeated its Latin and Etruscan neighbours, it granted them the status of *socii* (allies), who had to contribute troops to the Roman army. The usual method was to recruit an equal number of infantry, but three times as many cavalry.

It seems clear that only men of the richest class, mainly landowning families living in their estates outside Rome, were likely to be accustomed to horsemanship and able to afford horse and groom, in addition to personal weapons and equipment.

The warrior of Lanuvium thus had to be a rich young man, a “country gentleman”, part of a fighting elite and a proud citizen of a town still competing with the growing power of Rome; his grandsons would probably be members of the allied Italic cavalry which would become an important part of the armies which conquered the whole Mediterranean area, before being replaced by *alae* recruited among extra-Italian allies or client states.

²⁹ Dixon and Southern, *Roman Cavalry*, p. 20.

³⁰ *Ibid.*, pp. 20–21.

The Swords of the Italic Kings

Vincenzo d'Ercole*

THIS PAPER DISCUSSES A group of long, double-edged iron swords, with a cross hilt and two iron plates to strengthen the handle, and a wooden scabbard. They are known as Capestrano swords, named after the sword depicted on the eponymous statue The Warrior from Capestrano.

We find this type of sword, used preferably for slashing, from the end of the seventh to the first half of the fifth century B.C., in the central area of Italy (in the lands of the Umbri, Piceni, Vestini, Pretuzi, Equi and Marsi). Among all the known types of Capestrano swords, some are decorated with anthropomorphic and zoomorphic decorations on the hilt and on the mouth and tip of the scabbard.

The decorations are often representations of horses galloping or horsemen riding a skittish horse (Alfedena grave 179), although the animals on the scabbard of the Campovalano sword (grave 69) appear to be two winged griffins holding a human torso in their jaws. On the handle of the Nevio Pompuledio's (The Warrior from Capestrano) sword we can see two standing warriors, and on the tip of the scabbard are depicted mythological figures.

The swords decorated with mythological scenes were probably owned by high-ranking individuals.

In the central Adriatic area of Italy, by the end of the seventh century B.C., we can find long, double-edged iron swords with a cross hilt and two iron plates to strengthen the handle, and a wooden scabbard (fig. 1). They are known as Capestrano swords, named after the sword depicted on the eponymous statue (*The Warrior from Capestrano*).¹ This type of sword has been already studied by two German scholars: Peter Stary, at the end of the 1970s, and more recently by Joachim Weidig in his work on the Archaic area of the Bazzano (L'Aquila) necropolis.² We know of at least three hundred swords of this type; their number, however, will surely increase following the publication of items kept in storage by local museums, and the possible resumption of excavations.³ About half of the known Capestrano swords were found in northern Abruzzo (in the lands of Vestini Transmontani, Vestini Cismontani

* My sincere thanks to my friends Fabrizio Savi and Luisa Ferrero who offered their helpful support in drafting this paper.

¹ d'Ercole, 'Le spade tipo Capestrano'.

² Stary, *Eisenzeitliche Bewaffnung*; Weidig, *Bazzano*.

³ d'Ercole, 'I Vestini'.

and Pretuzi), although a significant number come from Sabina, southern Picenum⁴ and Umbria. Just a few were found in southern Abruzzo (in the lands of the Equi, Marsi, Peligni, Marrucini, Pentri and Frentani); in Lucania, Puglia and southern Campania (fig. 2). The distribution of this sword type clearly indicates that it was never used by the Celts, nor by the other peoples who lived in Italy before them, north of the River Po. The same can be said for the Etruscans, and for the *poleis* of Magna Grecia, who preferred short swords (*xiphoi*).⁵

CAPESTRANO SWORDS IN CONTEXT

Fighting with Capestrano swords

In their widest area of distribution (Sabina and northern Abruzzo), Capestrano swords replace the bronze or iron short swords used between the first Iron Age and the Orientalising period (from the tenth to the seventh century B.C.). They can be considered the archaeological marker of the passage from fighting in a closed formation to an open deployment with warriors fighting as individuals.⁶ The warrior's equipment itself, however, is more limited: we pass from the older style of two spears, a dagger, and often a war mace, to just a sword and spear.⁷ It seems that when fighting, the archaic warriors no longer used both hands at the same time but just one. Battles in the ninth to the seventh century B.C. would consist of several stages: the battle would open with the throwing of javelins; after that, an organised clash with spears and shields would take place; and finally, full-contact grappling with daggers and maces would conclude the battle. For the subsequent Archaic-Classic period (from the end of the seventh to the first half of the fifth century B.C.) however, just two fighting techniques can be discerned: throwing spears and fencing with swords.⁸

Due to the added weight of the weapon, the Capestrano sword is particularly fit for slashing. The best way to use this type of sword is as a horseman against other horsemen or, even better, against infantrymen.⁹ During this period in Abruzzo, however, we do not find specific and convincing zoo-archaeological or iconographic elements in favour of the widespread introduction of cavalry to the battlefield.¹⁰ Looking at the epigraphic sources, however, we know that in the Italic states (*Toutai*) at the beginning of the fifth century B.C., monarchies were being replaced by elective systems, and the *meddix* took the place formerly occupied by the king. Historically speaking, the political success of an aristocracy often

⁴ Cherici, 'La panoplia del guerriero'.

⁵ Martinelli, *La Lancia, la spada, il cavallo*; Bottini, *Armi*.

⁶ Bradfort, *Arrow, Sword, and Spear*; d'Ercole, 'I Vestini'.

⁷ d'Ercole, 'Le armi e gli armati'.

⁸ d'Ercole, 'L'armamento'.

⁹ d'Ercole, 'Le armi e gli armati'.

¹⁰ Drews, *Early Riders*.

originated in the creation of a class of horsemen who supported their privileges through the ownership and usage of a horse in war.¹¹

Obviously, we do not find Capestrano swords in all warriors' graves during the period between the end of the seventh and the first half of the fifth century B.C.; the majority of burials contain only a spear. The organisation of the archaic Italic armies into two different bodies seems to be quite clear: a majority of spearmen and a more limited number of swordsmen. This system could be very effective if we consider the spearmen as the fixed "anvil" of the formation, while the horsemen with swords were the mobile "hammer". A different option could include only infantry (similar to the Swiss squares or Scottish schiltrons), with the spearmen positioned front and centre and the more mobile swordsmen used on the wings to surround the enemy formation.

Iconography of Capestrano swords and scabbards

Among all the known Capestrano swords (of which there are more than three hundred), only five or six are decorated on the hilt, or on the mouth and at the tip of the wooden scabbard. The decorations representing men and animals are executed either in open-worked iron (Campovalano, Colle Cipolla, Alfedena, Capena) or in carved sheet bronze (Navelli). These images are also represented in stone on the statue from Capestrano. In Campovalano (grave 95) and Bazzano (graves 67 and 411), the decorations on the iron chape of the wooden scabbards are geometrical or floral, without a clear symbolic meaning. Apart from that, the most common representation consists of two horses facing each other: we find it on the tip of the Capena scabbard (grave 41), on the appliques on the hilt of the Colle Cipolla sword (grave 13), and on the mouth of the Alfedena scabbard (grave 179) (fig. 3 A). In the last case, the two-sided hook-shaped protrusions may represent horsemen straddling a skittish horse standing on its hind legs (fig. 3 B). On the mouth of the Capestrano statue's scabbard (fig. 4), on the handle of the knife tied to the same scabbard and on the bronze tip of the scabbard (fig. 5) from Navelli (grave 81) we can see two horses galloping in the same direction. In the Navelli item the wide-open mouths and the articulated tails of the depicted animals may suggest the representation of two dragons (or other mythological animals) instead of horses.¹²

A single horse is visible on the tip of the Capena scabbard (grave 41), and a four-footed animal, perhaps another horse, can be observed on the upper part of the tip of the Campovalano scabbard (grave 69; fig. 6 A–B). It is interesting to note, that while the lower part of the tip is always decorated on both sides, the upper part is decorated only on the external side and not on the side touching the warrior's body.

The lower parts of the scabbard tip seem to bear the most original decorations, generally with two animals facing each other. Unfortunately, they are the most damaged and least recognisable parts.¹³ On the tip of the Alfedena sword (fig. 7) we find two symmetrical four-

¹¹ Dawson, *The First Armies*.

¹² Biella, Giovannelli, and Perego, *Il bestiario fantastico*.

¹³ The graphic rendering of the decorations has been drafted by Massimo Pennacchioni.

legged animals facing each other with the two snouts almost merging, but the item's bad preservation does not allow us to identify the animals – perhaps horses again?

From a preliminary observation, the animals on the scabbard of the Campovalano sword (grave 69) may seem to be two wolves or dogs with raised snouts, probably howling to the sky (fig. 8 A–B). In analysing the details, however, the animal on the right side seems to be bigger than the other one and perhaps horned; the scene might then instead represent a wolf (on the left side) trying to bite the neck of a deer. Deer are often represented on the bronze pendants – *chatelaines* – found in the necropolis of southern Abruzzo.

Above the larger horned animal we might also identify a human torso. A “creative” interpretation could indicate that the dog is defending the man attacked by the horned animal, but we lack the data to reach a firm conclusion. On the same scabbard from Campovalano (grave 69) we can see a man devoured by wild beasts (fig. 9 A–B). In this case, there are two symmetrical winged lions or griffins facing each other that hold a human torso in their jaws. The fact that the death of a man by wild beasts, which symbolise strength and power (bulls, lions/griffins), is illustrated twice on the same item, cannot be considered accidental.¹⁴ Unfortunately, we know very little of Italic mythology, but surely the story of a hero killed by animals had to be a well-known and “significant” tale for the chief buried in grave 69 of Campovalano: he thus wanted the story to be represented more than once on the sword, which was the true symbol of his power.

On the bronze tip of the scabbard from Capena (grave 41) we can see “on both sides two open-worked animal heads (perhaps griffins) facing each other and jointed at the beginning of the neck”.¹⁵ On the back of the tip of this same object, we find a winged lion with a human leg in its jaws.

Nevio Pompuledio, the warrior depicted in the statue found in Capecstrano in 1934, surely had a royal status (based on epigraphic evidence).¹⁶ On the tip of the scabbard of his sword there are three incomplete figures (fig. 10 A–B): on the left, we can see a figure, half-man and half-animal (similar to a monkey) with a pig snout, standing on two legs and raising its arms. On the right, we have only faint remnants of another figure, standing on four legs. The preservation status is very much compromised and it is almost impossible to propose a satisfying interpretation. The only possible suggestion is that the figure on the left might refer to the Minotaur myth. On the handle of this sword we can clearly see two human figures, probably two standing warriors (fig. 11); the lower one, closer to the hilt, probably holds in his left hand a spear or a shield raised to protect the head. Two horses are recognisable on the hilt, that may hypothetically be linked to the two warriors on the handle.

¹⁴ Bellucci, ‘Il grifone nel vicino oriente’.

¹⁵ Benelli and Naso, ‘Relazioni e scambi’.

¹⁶ La Regina, ‘Il guerriero di Capecstrano’.

The archaeological context of decorated Capestrano swords

Four of the six known Capestrano swords with zoomorphic and anthropomorphic decorations come from different areas: Capena (Faliscan territory), Campovalano (Pretuzi territory), Colle Cipolla (Peligni territory) and Alfedena (Pentri territory). Current research shows that the remaining two (on the Capestrano Warrior statue and from the Navelli grave) come from the lands of the Vestini Cismontani.

Campovalano grave 69 is one of the richest burials in the necropolis; it contains a war chariot, bronze horse bits, a set of bronze vases with a large Kurd situla, and two sets of iron weapons.¹⁷ It is the only Abruzzo necropolis with two swords of the Capestrano type: one is “plain”, and the other has a richly decorated scabbard. A similar burial is Capena grave 41, a chamber tomb with six niches. In 1904 two Capestrano swords were found in one of the niches during illegal excavations. One sword, with a decorated scabbard, is currently in the Römisch-Germanisches Zentralmuseum in Mainz, while the plainer one is kept in the Museo Preistorico-Etnografico Luigi Pigorini in Rome.

With regard to the sword, the scabbard and the knife on the Capestrano statue, the fact that he was, quite unusually, made of stone, is evidence that shows his importance. Furthermore, the warrior is equipped with complete battle gear and has a *nomen* that had a royal tradition among the Sabines: *Numa Pompilio-Nevio Pompuledio*. It is interesting to highlight that without the statue, the connected burial (grave 3) would not have shown any elements of specific relevance.

Also, the finds (including the decorated bronze scabbard tip) in Navelli grave 81 in 2014, which are still waiting restoration, do not seem particularly relevant.¹⁸

Colle Cipolla grave 13 is not as rich and important as Campovalano grave 69; the most original element of this burial is that it was placed at the highest point and almost in the middle of the fortified settlement, far from the necropolis located along the fortifications. The grave was covered with a tumulus twelve metres wide in diameter that was subsequently enlarged to host a slightly later adult female burial, most likely the partner of the original owner of the grave.¹⁹ A short time after the completion of the funerary monument, this site on high ground was abandoned and the settlement relocated to the river plain where the Roman city of *Superaequum* would later be built.

CONCLUSION

If we look at the relevant archaeological contexts as they have been described, it is clear that the Campovalano and Capestrano swords were owned by high-ranking individuals. Colle

¹⁷ Chiaramonte, d’Ercole, and Scotti, *La necropoli di Campovalano II*.

¹⁸ My sincere thanks to Valeria Acconcia, director of Navelli excavation, for having provided data not published yet.

¹⁹ d’Ercole, ‘Lo spazio funerario in area abruzzese’.

Cipolla grave 13 might have been the burial of a local low-ranking chief – perhaps a leader of the Superequani, a people of the Peligni?

The same consideration can be applied to the man buried in Navelli grave 81: the leader of the central area between the three federate units (the l'Aquila plain, the Navelli plain and the Capestrano basin) forming the territory of the Vestini Cismontani. Nevio Pompuledio should have been the king of all these peoples, at least for a while.

We cannot say much about the Alfedena sword; is it the weapon of a local low-ranking chief or of the king of all the Pentri people? The second option seems to be supported by the quality of the decorations on the sword and the large dimensions of the necropolis.

An antenna dagger found in Colle del Capitano grave 22 (Monteleone di Spoleto, Umbria) can be regarded as an ancestor of the swords with decorated scabbards.²⁰ It is a male burial from the end of the seventh century B.C. with a small bone plate (from either a scabbard or handle cladding) decorated with two animals facing each other.²¹

During the Orientalising period, the artisans or smiths who decorated the archaic swords may have been influenced in their work by different objects. The first comparable items are the so-called *kardiophylakes* or “disc breastplates”.²² In recent years, Giovanni Colonna's studies²³ have demonstrated, with specific references to the Fossa²⁴ and Avezzano²⁵ necropolis excavations, that the iron (Fossa) and bronze (Avezzano) discs with geometric decorations are not aspects of armour,²⁶ but rather female clothing ornaments used in the eighth and seventh centuries B.C. The discs from Alba Fucens (the territory of the Marsi people) are also related to female clothing; they are decorated with animals or beasts either in rows or facing each other: We have geese/ducks, hares/rabbits, dogs/donkeys, but also horses similar to those depicted on the swords.

The discs of the Mozzano type (from the necropolis of Fossa, Bazzano, Marino del Tronto and Mozzano) are true breastplates and in their shape they recall a shield. Most *kardiophylakes* are decorated with mythological animals (like the Capena and Numana groups); the Alfedena type (Pentri people) is characterised by a horse with an animal-shaped tail.

Always with reference to female clothing, we must take into account the bronze (and more rarely iron) belts with openwork decorations of real or imaginary animals.²⁷ The belts consisted of square metal plates covering leather or cloth bands which could be arranged in one, two, four or six “windows”. In these windows, we find decorations with horses facing each

²⁰ De Angelis, ‘Colle del Capitano’, p. 284.

²¹ De Angelis, ‘Tomba 22’.

²² Tomedi, *Italische Panzerplatten*.

²³ Colonna, ‘Dischi-corazza e dischi di ornamento’.

²⁴ Cosentino, d'Ercole, and Mieli, *La necropoli di Fossa*.

²⁵ Ceccaroni, ‘Necropoli Cretaro-Brecciarà’.

²⁶ Papi, *Dischi-corazza abruzzesi*.

²⁷ Weidig, ‘I draghi appenninici’.

other (Campovalano 115 and 119 are rich female burials), mythological animals (similar to those represented on *kardiophylakes*), or the so-called “Vestini dragon”, a horse/bird animal.²⁸

The most accurate comparison, however, can be made with the openwork iron decorations of the two-wheeled chariot from the Campovalano grave 121, a tumulus twenty metres in diameter.²⁹ On the war-chariot we can identify winged felines, horses, deer and other imaginary beasts.³⁰ It is clear that we have not only the same decoration technique (openwork iron), but also the same iconography that we find on the swords and their scabbards.

The fine quality of the sword scabbard from grave 69 (also a burial with a chariot) may support the fact that we are perhaps looking at the work of the same artisan or workshop who, around the end of the seventh century B.C., was assigned with decorating the main weapons of the Pretuzi kings: chariots and swords.

The idea of “story-telling swords” was adopted by other Italic peoples during the Archaic period who achieved their goal through depictions in stone (like the Vestini in Capecetrano for their king), or through executing the images on iron objects (like the Peligni in Colle Cipolla and the Pentri in Alfedena).

The importance of these representations, even if limited in number and decayed, is increased by the fact that we have almost no pictorial evidence of the archaic Italic world; no painted tombs or pottery, no organic remains (cloth, wood, etc.), very few (no more than fifteen) stone images³¹ and equally rare epigraphic evidence. The items coming from male burials in Abruzzo can be considered consistent in number and in their elements: the differences in status and role of the dead are highlighted not by the quantity of the items but by the grave location, its shape and by the specific contents of the single burials.

The archaic swords are decorated with scenes originating directly from the myth and are full of symbolism. Almost always the main character is the horse or its imaginary variant (a dragon?): the mount of the king or hero holding the “magical weapon”.

Finally, we should not forget that the items already described (in particular those from Campovalano and Alfedena) were restored no later than the 1970s, without the availability of the most advanced technologies and prior to radiographic analysis. Only recently was the widespread technique of inlaying bronze on iron (in particular on iron weapons) “discovered” in the Middle Adriatic area. The risk is that we have definitively lost irreplaceable elements and details!

²⁸ Weidig, ‘Der Drache der Vestiner’.

²⁹ Chiaramonte, d’Ercole, and Scotti, *La necropoli di Campovalano II*.

³⁰ Di Domenicantonio, *I carri nelle tombe*.

³¹ d’Ercole, ‘Menhir, stele e statue’.

FIG. 1: Sword with Capestrano type scabbard, Campovalano necropolis, grave 69.



FIG. 2: Map showing the central distribution of Capestrano swords (in red). The widest area of distribution is shown in blue.

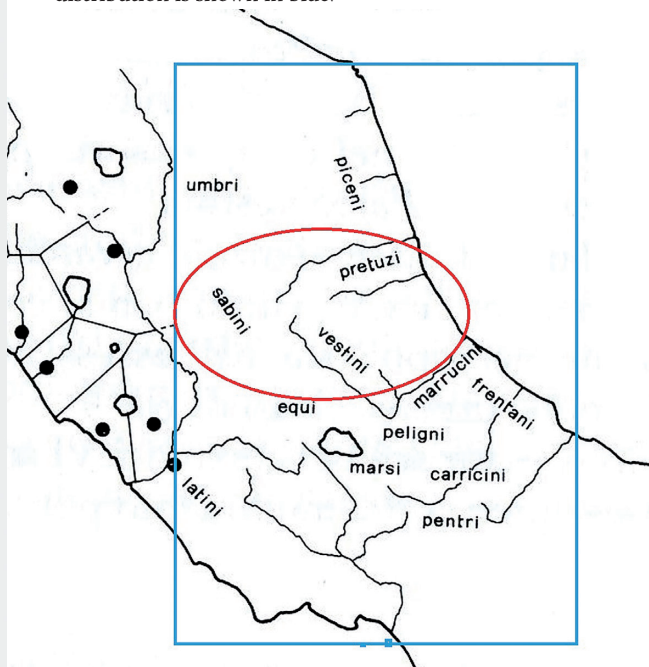


FIG. 3 A–B: Sword
scabbard from the
Alfedena necropolis.



FIG. 4: Sword and knife on the
statue of the Caestrano warrior.





FIG. 5: Scabbard of a bronze sword from da Navelli.

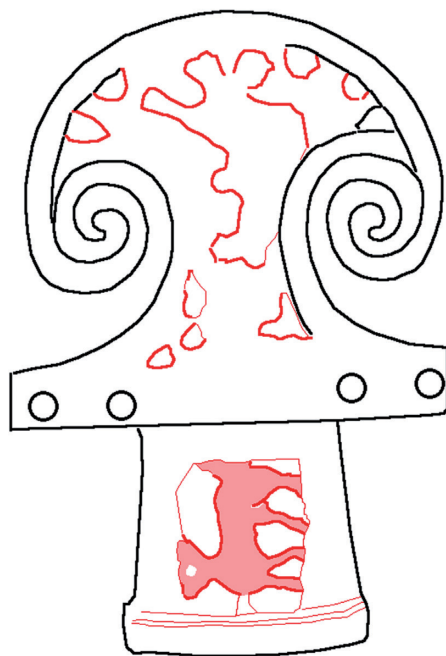


FIG. 6 A-B: Sword scabbard from the Campovalano necropolis, grave 69.

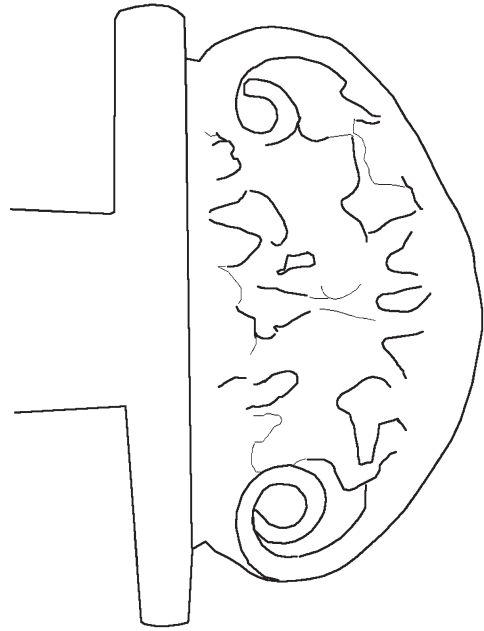


FIG. 7 A–B: Sword scabbard from the Alfedena necropolis.



FIG. 8 A–B: Sword scabbard from the Campovalano necropolis, grave 69.

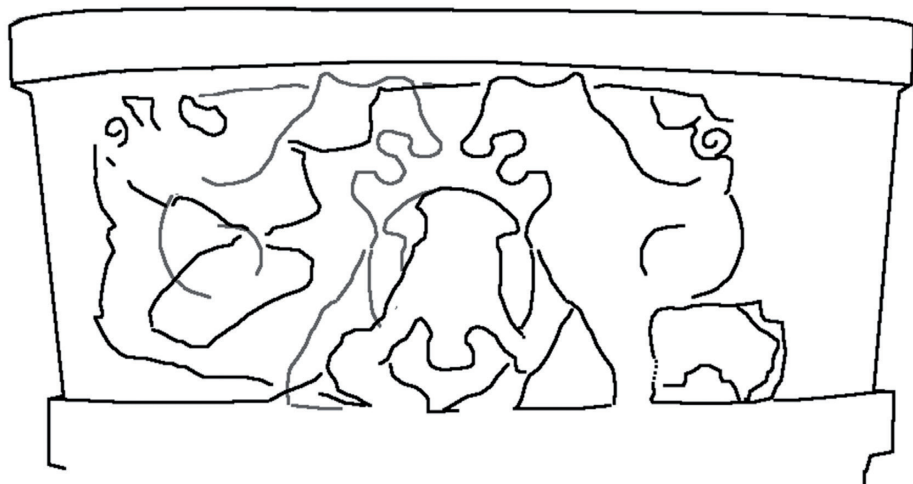
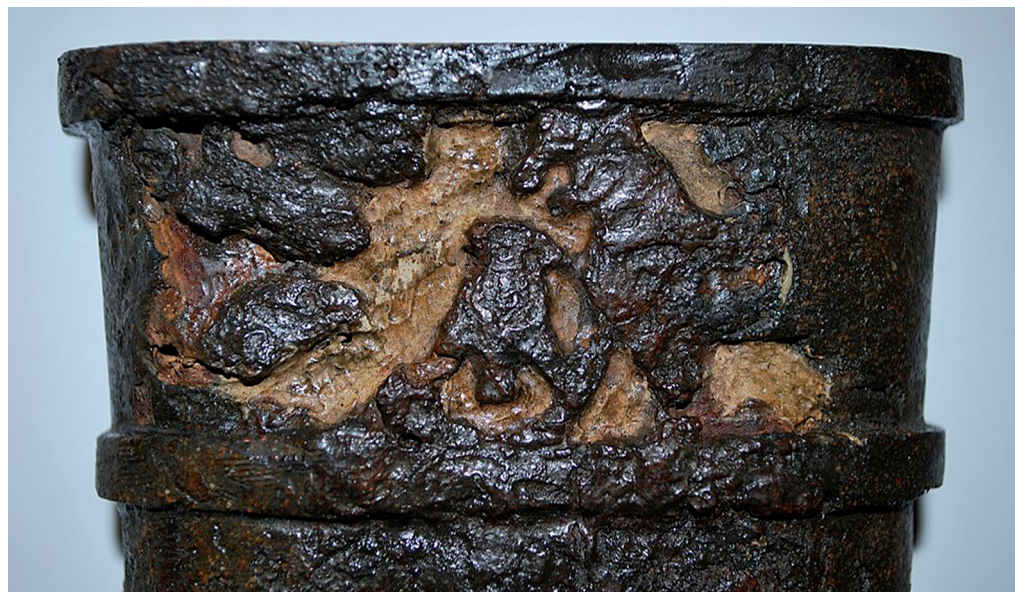


FIG. 9 A–B: Sword scabbard from the Campovalano necropolis, grave 69.

Three Treasures in One Blade

Thoughts on a Rare Form of the Japanese Sword

Michael Mattner

WHEN THE WORDS “JAPANESE sword” are uttered, most people think of the katana, the quintessential, single-edged, curved sword which claims an undeniable place in popular culture. Yet, the Japanese sword (*nihontō*) comes in many different shapes and sizes. This article focuses on a rarely used shape of Japanese swords – the kogarasumaru-zukuri.

The Kogarasumaru (the Little Crow) is a blade forged in the ninth century that became famous as an heirloom of the Taira family, the most powerful warrior family of twelfth-century Japan, who ruled the country almost on their own until they were brought down in the Gempei War of 1180–85. After their downfall very few blades were fashioned in the likeness of the Kogarasumaru. The aim of this paper is to assess the reasons for why this was the case. Taking the actual form of the Kogarasumaru as a starting point, this paper addresses the question from technical, martial and symbolic angles to find a reason for the rare appearance of this kind of blade.

The sword functions as a powerful symbol in Japanese society. Ogasawara Nobuo writes that “the history of Japan and the history of the sword are one”.¹ Given their symbolic value, the reception and distribution of swords within a society is an issue to be aware of. The Japanese sword (*nihontō*) enjoys a high popularity in modern popular culture as well as in circles of traditional sword fighting and forging. There are different shapes of *nihontō*, among them the so-called *kogarasumaru-zukuri*. The latter are named after a specific blade, a shape which is neither well-known nor widely distributed. When looking at auctions and catalogues, this shape is notably absent. Only a handful of blades of this type remain to this day.

The purpose of this paper is to investigate the reasons for this scarcity and pose possible answers, as well as proposing new questions for further research. In order to achieve this, the main thesis is rather unconventional and also aims to open up some areas of thought left unexplored until now.

The Hepburn transcription has been used throughout this article for Japanese terms. The only exception is the word *Kogarasumaru* for the blade in question, which is spelled with a capital “K” to distinguish it from the sword type. The terms “Japanese”, “Japanese people” and the “Islands of Japan” are used for the area of early seventh- to twelfth-century Japan,

¹ Ogasawara, *Tōken*, p. 1.

without respect to the actual polities or inhabitants of these regions in the chronological and geographical frameworks of this article.

NIHONTŌ: THE JAPANESE SWORD

Today, the word *nihontō* is used to name a category which encompasses all blades which are forged in specific shapes and with specific techniques which are said to be Japanese. These techniques are regulated and well formulated in modern Japan. These regulations, however, did not exist prior to the twentieth century. Generally, the history of the Japanese sword is divided as is shown in table 1.

TABLE 1: The history of the Japanese sword (with approximate translations for the Japanese names), based on: Tsuchiko, Sinclair and Ōsawa. There are several dates given for the first period, as there is no clear consensus when the period of the ancient swords should begin.²

<i>Jōkotō</i> : “ancient swords”	527/645/710–900
<i>Kotō</i> : “old swords”	900–1596
<i>Shintō</i> : “new swords”	1596–1781
<i>Shinshintō</i> : “very new swords”	1781–1876
<i>Gendaitō</i> : “modern day swords”	1876–today

A *nihontō* must be made of steel, more specifically from *tamahagane* (literally “jewel steel”), which traditionally is made in a *tatara* furnace, even though today steel from other sources is sometimes accepted too. Blades made from other materials are not considered *nihontō*. *Nihontō* are forged by folding the steel again and again over itself until the desired properties are achieved. Together with the inserting of a bar of softer steel between the folded steel bars, this accounts for the great stability, durability, flexibility and hardness of the blade.³

The modern image of a Japanese blade is a curved, single-edged steel sword, but several different kinds of shapes (*sugata*) and structures (*tsukuri*) are subsumed under this label.⁴ Figures 1 and 2 present a simplified, partial overview of different types.

Most types of *nihontō* are single-edged blades and there are only a few exceptions: the *yari*, the *hoko*, the *ken* (or *tsurugi*), the *moroha-zukuri* and the *kissaki-moro-ha-zukuri*. The latter is of interest for this paper, as it is also regularly named *kogarasumaru-zukuri*, after its most prominent representative.⁵

The other types shown are, for different reasons, not of interest to this paper. The *tsurugi* is a design imported from the Chinese mainland and by necessity of its design is used in a different way. The same goes for the *moro-ha-zukuri*, which is only found on daggers (*tantō*),⁶

² Tsuchiko, *New Generation*, p. 13; Sinclair, *Waffen und Geist*, p. 9; Ōsawa, *Nihontō Jiten*, p. 42.

³ Kapp and Yoshihara, *Schwertschmiedekunst*, pp. 24–29.

⁴ Ōsawa, *Nihontō Jiten*, pp. 34–40.

⁵ Sasama, *Bugu Jiten*, p. 99.

⁶ Hagenbusch, *Kunstschwerter*, p. 63.

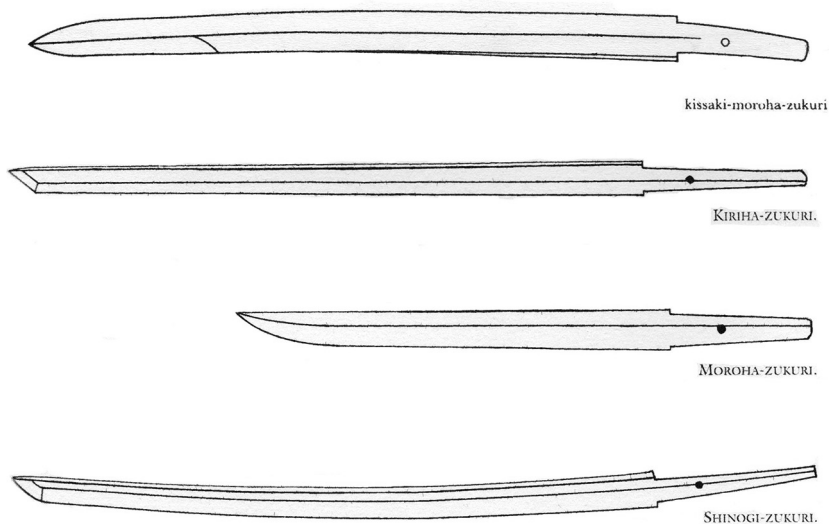


FIG. 1: Overview of *nihontō-tsukuri* of swords and daggers.

which are mostly stabbing weapons. The *naginata* is shaped like a sword blade, but mounted as a polearm, just like the two varieties of spears (*yari-zukuri* and *hoko*); as such they are used in a different manner than swords.

The *kogarasumaru-zukuri* is the only (partially) double-edged shape which is found on a curved blade. The curvature itself developed between the ninth and the twelfth centuries, a time during which the sword was not as commonly employed as is generally assumed. The warriors of the time favoured combat from horseback and were predominantly equipped as archers. Swords were more often used by fighters on foot, but it was not the weapon that shaped the battlefields of this time.⁷

The development of the curvature is attributed to the legendary swordsmith Amakuni, who is supposed to have lived in the ninth century. The same Amakuni is also sometimes said to have been the one who created the *Kogarasumaru*.⁸

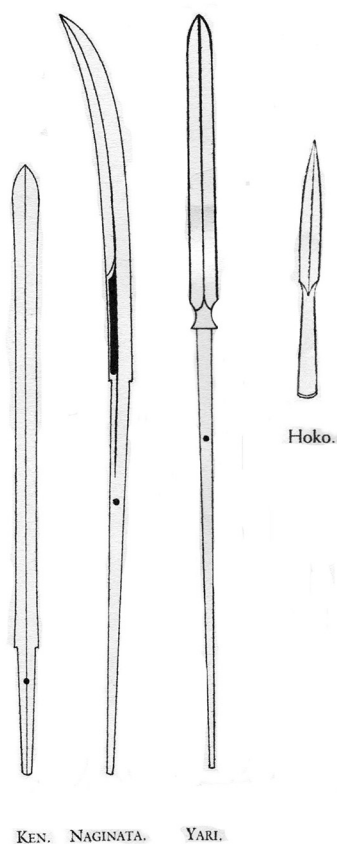


FIG. 2: Overview of *nihontō* polearms.

⁷ Friday, *Warfare*, pp. 10–105.

⁸ Satō, *Sword*, p. 32.

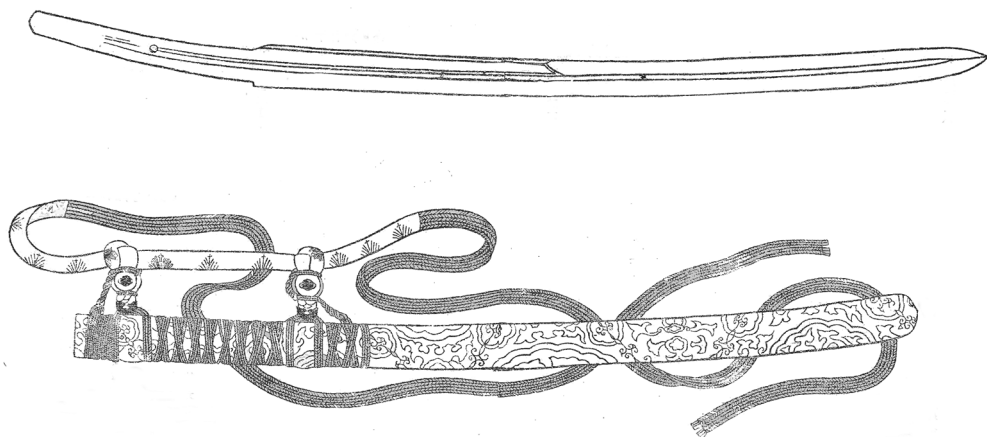


FIG. 3: The *Kogarasumaru* with its sheath from the eighteenth century. The returning back edge of the *Kogarasumaru* is very long, much longer than on other blades of this *tsukuri*.

THE LITTLE CROW

The *Kogarasumaru* (小烏丸, Little Crow) is forged in the *moroha-zukuri* style with a length (*nagasa*) of 62.6cm and a curvature (*zori*) of 1.2cm.⁹ The tang bears neither signature nor discernible file marks and has a single hole for the handle's rivet (*meguki*). It is possible that the blade was shortened from a polearm to a sword and therefore the signature has been lost.¹⁰ The blade is generally dated to the tenth century but the shallow curvature, however, is more similar to the styles of swords that became predominant in the late sixteenth century, as the curvature of tenth-century blades tends to be more pronounced in the lower part.¹¹

Legend has it that the sword was carried to the emperor's court by a huge crow (*karasu* 烏), which was said to be eight *shaku* (*shaku* = 30.3 cm, 8 *shaku* = 242.4 cm) in length. Most courtiers were terrified by the animal, but not Emperor Kammu (reigned 781–806), who welcomed it.¹² The crow came from the grand shrine of Ise, one of the holiest places in Japan, where at least one of the Imperial Regalia is housed at all times. This is how the sword came to be part of the Imperial collection, and also explains its name, as the emperor named it in honour of the crow. The number eight represents eternity or the entirety of things as well as luck in Chinese cosmology, thereby stressing the mythological aspect of the crow.

As Kammu was the founding father of the Taira family, the sword became an heirloom of his family and, after their downfall, eventually returned to Imperial hands. There it remains today, under the care of the Imperial Household Agency.

⁹ Maki, *Meitō Den*, p. 50.

¹⁰ Satō, *Sword*, p. 32.

¹¹ Hagenbusch, *Kunstschwerter*, pp. 246–47.

¹² Maki, *Meitō Den*, p. 50.

REASONS FOR SCARCITY

Firstly, technical and martial reasons which might lead to the rarity of blades like the *Kogarasumaru* are taken in to account.

Technical reasons

We first examine the process of producing a Japanese sword. The *kogarasumaru-zukuri* is a curved blade, therefore the creation of this curvature is of interest. To some degree this curvature is a by-product of the quenching process called *yaki-ire*. When the blade is fully forged, all parts are welded together, with the edge already defined. In order to harden the blade it is coated in clay. The back of the blade is coated much more thickly than the edge. This clay is then scratched off the cutting edge in a pattern the smith deems appropriate. This pattern will define the waterline (*hamon*) of the blade, one of the most valued aspects of a finished sword.¹³

When this process is complete, the blade is heated again, edge first, in the fire and then cooled in water. Aside from providing the tempering, this procedure is also responsible for the curvature of the blade, as the cooling naturally produces one.¹⁴ The resulting curvature is usually only minimally adjusted to achieve the desired shape. The *kogarasumaru-zukuri*, of course, is problematic in this regard. In order to sharpen the second edge of the blade, whilst maintaining the desired curvature, a careful shaping of the blade prior to the *yaki-ire* is necessary. It is not advisable to shape the blade much more after hardening, as the now hardened material is far more prone to breaking. Therefore, in order to produce a blade with the desired *zori*, a high level of proficiency is required.

It is reasonable to assume that among the swordsmiths of the time, not all were able to produce this result with a high degree of success, as even with only one edge the *yaki-ire* is prone to failure. On average, only half to three quarters of blades survive the process without needing to be reforged.¹⁵ Thus, the difficulty alone precludes the existence of many blades in the *kogarasumaru-zukuri* style.

Martial reasons

During the ninth to the twelfth century there was a transition both in Japanese forging and fighting techniques. The old sword (*kotō*) period is generally seen as rather long and within it the curvature of swords was established. There exist many reasons for different types of blades, but the actual usage of the sword is undeniably one of them.

¹³ Kapp and Yoshihara, *Schwertschmiedekunst*, pp. 85–95.

¹⁴ Mäder, *Stähle, Steine und Schlangen*, p. 69.

¹⁵ Kapp and Yoshihara, *Schwertschmiedekunst*, p. 96.

In later times, the sword was often referred to as the soul of the *samurai*, but it was not a signature weapon at the time discussed in this paper. The samurai was primarily a mounted archer and the sword was mainly used in emergencies, or by foot soldiers. Naturally, the shape of weapons follows the needs of those using them. The straight swords, which were an import from the Chinese mainland, almost disappeared during the chronological framework of this paper. There are several advantages to a curved sword compared to a straight one, but suffice it to say that around the time that the *Kogarasumaru* was forged, the fighting techniques were very much in flux and with them the shape of the preferred blade.¹⁶

The true formalisation of Japanese sword fighting techniques is generally assumed to have occurred during the Edo Period (1600–1868), in which the warrior class of the samurai found themselves as bureaucrats with the need to justify their superior social standing through constant martial readiness. Here we have the transition from real fighting techniques, which were actually employed in battle, to a school of swordsmanship which used sword fighting mainly as a focus for mental and physical training, and as guidance for a “decent life” within the boundaries of a rigid, moral code of honour.¹⁷

There are several extant picture scrolls and illustrated fight books from the sixteenth century onward. Given the idea of continuity in the Japanese mind, and the fact that the schools of this time tried to formalise a fighting style while preserving, at least in theory, its deadliness, the preserved techniques should be relatively close to the original fighting styles. Therefore, one may assume a certain practicability of the shapes and designs of the weapons used.

Yet even with the usefulness of the curved blade established the question of the second edge on the *kogarasumaru-zukuri* remains. In most fighting schools, having a second edge on the blade has only a marginal effect on most striking techniques. Arguably it would add to the weapon’s threat, as it opens up the possibility of some backhanded cuts that are not possible with the flat backs of most Japanese blades.

While bringing only the small advantage of added backhanded cuts, which are, to my knowledge, not documented anywhere, there are several situations in which the second edge becomes disadvantageous to the wielder. The first one is in the sheathing and drawing of the blade. While sheathing the blade, the left hand holds the sheath, hand at the underside to prevent it from flipping.¹⁸ This also happens to be where the flat side of the blade is located, thus minimising the risk of injury. The same is true for unsheathing the blade for cleaning. With a second edge the number of times one inadvertently cuts one’s hand would increase. This argument, however, is weak and anachronistic: enough training would easily minimise the risk of injury. Furthermore, this way of sheathing might also have been a later development.

The second situation also bears the risk of self-harm. Even though they are few in number, there are stances which put the back of the blade on one’s arm or hand; sometimes in order to give the movement more strength, or simply as a means of balancing. An example can be

¹⁶ Friday, *Warfare*, pp. 81–83.

¹⁷ Conlan, *Fighting Techniques*, pp. 11–15.

¹⁸ Roach, *Cultural Icons*, p. 167.

seen in the training scroll of the *Yagyu* family.¹⁹ The *Yagyu* family is counted among the best sword schools of their time and therefore it can be assumed that other schools had similar techniques. More modern examples can also be found, such as in modern *iaijutsu* practices.²⁰

Again may one argue that this is an anachronistic argument, as these techniques might very well have been developed after the blades developed flat backs. Yet as the martial arts in Japan pride themselves on long and unbroken lines, it is likely that such manoeuvres existed before this development. They would be an argument against constructing blades in this manner, as the second edge would prevent the wielder from using his full fighting potential.

The third point deals with protecting the blade. Hardened surfaces hitting each other easily lead to broken blades. Parries with the soft back are far more viable as although they may result in notches, the cutting edge is less likely to be broken. Therefore, most parrying techniques rely either on a deflection or parry with either the back or flat to get the opponent's blade out of the way. The integrity of the hardened blade on the back of the *Kogarasumaru*, however, would still be in great danger should a parry with the back edge of the blade be employed.

In conclusion, there are some legitimate martial arguments as to why a second edge is detrimental to the use of the sword. Still, none of them are utterly convincing, as all of them could easily be rectified by adapting training or fighting techniques used for fighting with such a weapon.

SYMBOLISM OF THE SWORD

The importance of symbolic gestures in premodern societies is well known and documented. In the twelfth century the sword had not yet taken its place as the "soul of the samurai", an ideal not to be constructed until the seventeenth century, but it was still a potent symbol of warriorhood. "Clash of swords" or "wielding a sword" were phrases indicating a battle.²¹

The curved sword appeared at a transitional time when power shifted from the court nobles to the warriors. Up until to the twelfth century it was common for court nobles to carry swords, but all of these blades were the *chokutō*, the straight-edge type.²² To my knowledge no picture of a court noble carrying a curved sword at his side exists.

Two things must be considered if we are to understand the symbolic dimension of the *Kogarasumaru*: karma and the Imperial Regalia of Japan. From the sixth century onwards, Japan has been highly influenced by Buddhist ideas, and with this came the notion of karma. In very simple terms this is the idea that the deeds of a former life will haunt you in the future. We thus need to be able to understand the karmic entanglements of the *Kogarasumaru*.

¹⁹ Yagyu, *The Life-Giving Sword*, p. 149.

²⁰ Roach, *Cultural Icons*, p. 169.

²¹ Friday, *Warfare*, p. 78.

²² Sasama, *Bugu Jiten*, p. 97.

THE KOGARASUMARU AND THE REGALIA

I propose that the *Kogarasumaru* acted as a stand-in for the Imperial Regalia for the Taira family. To verify this thesis, a closer look at the Regalia and the history of the Taira family is necessary.

According to the *Kojiki*, the oldest extant mythological-historical work of Japan, the Regalia were handed down to the Japanese people by *Amaterasu Omikami*, the sun goddess, to her grandson, who established the Imperial line. She gave him a mirror, several jewels and the sword *Kusanagi no Tsurugi*.²³ The Regalia are always present when a new emperor is enthroned and throughout history have been kept close to him. Today they are kept in three different shrines throughout Japan and none but the shrine guardians are allowed to see them. The mirror is situated at the grand shrine of Ise, the same place that the crow which delivered the *Kogarasumaru* hailed from. The jewels are kept at the Imperial Palace in Kyōto, and the sword in the Atsuta shrine in Nagoya, which ranks just as highly as the shrine of Ise. Even during the enthronement ceremony they remain within sealed boxes during the public part of the proceedings. As far as the sword is concerned, a replica has been used in the proceedings while the original remains safely at its shrine since the seventh century.²⁴

The regalia symbolise three different virtues: power, wisdom and the benevolence of the Imperial Family. They are seen as the ultimate proof of authority. Yet how can a single blade incorporate all three regalia? In order to demonstrate this, we are going to look at the three Regalia in turn.

The sword

This is the easiest comparison of the three. The *Kogarasumaru* is a sword, just like the *Kusanagi no Tsurugi*. Arguably, the *Kusanagi* is a blade of the *tsurugi* type with a straight blade and two edges. To be exact, the sword generally assumed to be the *Kusanagi* (fig. 4) is, in the sense of *nihontō*, more correctly defined as a bronze dagger rather than a sword. It is described as such in contemporary encyclopaedias.²⁵ But in the *Kojiki* it is denominated as a *tachi*, the

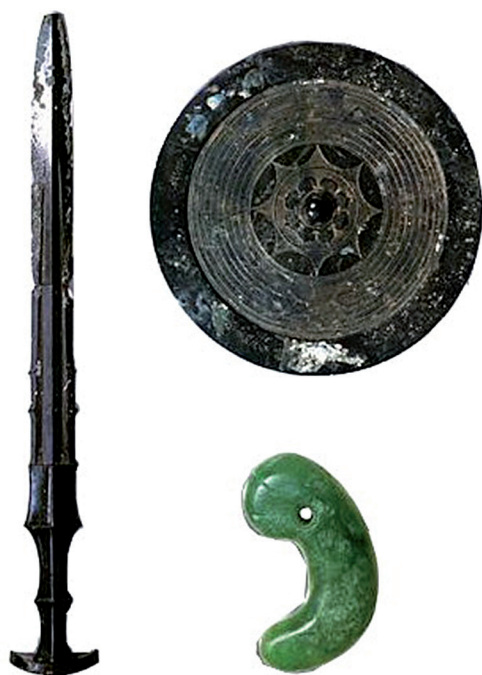


FIG. 4: The three Regalia of Japan ('The three sacred treasures').

²³ Naumann, *Mythen*, pp. 201–10.

²⁴ Naumann, *Mythen*, p. 213.

²⁵ Ōsawa, *Nihontō Jiten*, p. 264.

same term that is applied to swords like the *Kogarasumaru*.²⁶ This reminds us that the term *nihontō* is in fact a modern creation, as such a distinction was not made in the twelfth century. As the Taira were the appointed defenders of the realm, the use of a functional weapon as a symbol of their authority would be only logical. As such, the idea that the *Kogarasumaru* stands in for the Imperial Sword is quite convincing.

The mirror

Mirrors at this time were not sheer glass surfaces but rather polished bronze discs with a decorated back. What we see in the depiction (fig. 4) is in fact the reverse of the mirror. Depending on the mythology, the mirror allows one to see the *tama* of Amaterasu, or even is her *tama*.²⁷ *Tama* is a word often translated as soul or essence. Thus, the mirror gives you access to Amaterasu's wisdom.

How does this tie in with the *Kogarasumaru*? Polishing techniques used in order to make visible the composition of the metal and the waterline (*hamon*) of a blade date back to at least the tenth century, and may even have originated during the sixth.²⁸ We can thus assume that the *Kogarasumaru* was in a well-polished state in the twelfth century. The good overall condition of the blade today is proof of the regular and professional care it has received over the centuries. The typical polish of a *nihontō* is not that of a completely shiny surface, but it will still reflect light and images. Thus, the reflective property of the sword, representing this basic property of a mirror, is present.

In the eighteenth century the idea of swordsmanship, and by extension the sword itself, as a means of reflecting on oneself and others, became very prominent even though it probably originated in an earlier time.²⁹

The idea of the literate, educated and self-aware warrior has a long tradition in Japan and is derived from a Chinese ideal. In Japanese it is called *bun-bu* (*bun* meaning education or learning, and *bu* meaning martial skills), so the ideal Japanese warrior is one steeped in tradition, education and also well versed in the arts of fighting.³⁰ Therefore I propose that the *Kogarasumaru* may stand for the mirror as well.

The jewel

The *magatama* are the one aspect of the Regalia which are hardest to grasp. The image of the jewels appears quite early in the *Kojiki* in different situations, but always as a sign of divinity.³¹

²⁶ Kinoshita, *Kojiki*, p. 24.

²⁷ Naumann, *Mythen*, p. 201.

²⁸ Takaiwa, *Polishing*, pp. 40–41.

²⁹ E.g. Kammer, *Zen*, pp. 6–8.

³⁰ Blümmel, 'Krieger', p. 263.

³¹ Naumann, *Mythen*, p. 211.

They are not attributed with special powers of any kind, but are still an explicit part of the Regalia.

The word *magatama* (勾玉) includes the word for jewel or simply treasure (玉), hinting at the idea that the jewels are mostly there to act exactly as such – a treasure to be safeguarded. The other part is a word for bending or a curve. By name they are literally the curved jewels, just as the *Kogarasumaru* is a curved blade.

The shape of the *magatama* can even be superimposed upon the form of the *Kogarasumaru*. One could either put the smaller end at the bottom, in which case the larger part of the *magatama* corresponds with the edges of the blade and the smaller is the handle, or vice versa, one could interpret the thicker part as the handle, with the hole more or less being in the place of the rivet hole. All of the outer edges and the small parts would then correspond to the edges of the *Kogarasumaru*.

It could be said then that the blade also represents the jewels. That the sword had the status of a treasure is beyond doubt, especially since at the time it was an heirloom of the Taira family.

We now see that it is possible to argue that the *Kogarasumaru* was intended to act as a stand-in for the Imperial Regalia. But why would the Taira want such a thing, and why would this be an argument for the rarity of the type? To understand that, we have to take a look at the history and the downfall of the Taira family.

THE RISE AND FALL OF THE TAIRA

The twelfth century saw the rise to power of the warriors of Japan. Between the seventh and twelfth centuries power was generally held by the court nobles who governed the land and provinces in the name of the emperor. When the need for martial action arose, the court employed local residents who commanded warrior cohorts (*bushidan*) to do their bidding. In return the warriors were compensated. For several centuries the system worked well, as there was a clear distinction between nobles and warriors, and the posts and rewards for which they were eligible. Over time however, these local leaders of warrior bands gained more and more influence and eventually tried to get access to the court itself and influence court politics.³²

Two warrior families fought for supremacy in the twelfth century throughout several uprisings, which ultimately carried the fight into the capital. They were the Minamoto and the Taira. Both families were founded by imperial sons but were simple warrior families from the countryside rather than court nobles. In the Heian courts this made a great difference, as being cultivated was a sign of fitness to rule. This time is generally seen as the start of a transitional period where the warriors rose to the position of primacy among the three major powers which had effectively shared power for several centuries; the court, warrior families

³² Souyri, *Upside Down*, pp. 17–21.

and the great temples.³³ A transition which finally would be concluded in the seventeenth century.³⁴

Eventually the *Heike* or Taira³⁵ became the most powerful and influential family in Japan. This is most easily illustrated in the person of Taira no Kiyomori (1118–81), the head of the Taira family. At the height of his power he had married two of his daughters to emperors and was grandfather to the emperor Antoku (reigned 1180–85). The Taira had family members in almost all influential positions at court and in the countryside, and thus effectively ruled the country. Kiyomori also tried, even though he failed, to move the capital to another city. This not only proves his ambitions but also his cleverness in attempting to remove the influence of the old elites in Kyōto.³⁶

I propose that around the height of Kiyomori's political power the *Kogarasumaru* assumed the role of the Imperial Regalia for the Taira family. As only the emperor had the access and the right to the true Regalia, the *Kogarasumaru*, which came into possession of the Taira family by inheritance from an emperor, served as a public symbol of Taira authority. It can be assumed that the existence and design of the sword was well known in these days.

The Taira ultimately fell from power. Due to a combination of different factors they were purged from power by the Minamoto during the course of the Gempei War of 1180–85.³⁷ Most important here is the battle of Dan no Ura (1185). Famous for being one of the few important naval battles in Japanese history, the fight led to three important events as well as the downfall of the Taira.

Antoku Tennō, the emperor at the time, died in the battle and two of the three Imperial Regalia were lost. The sword and the jewels were lost during the fight and sank to the bottom of the sea. The mirror nearly shared this fate, but was recovered just in time. The *Heike Monogatari*, the warrior-tale in which the rise and fall of the Taira is preserved to this day, claims the lost sword to be only a replica, which might be true, but of course cannot be verified today. According to legend the jewels were washed ashore some days later and thus recovered. Both claims might have been fabricated to guarantee the continuity of the Imperial Regalia. As a consequence of this battle the Taira family not only fell from power due to their actions, but were also responsible for the loss of the life of an emperor and two thirds of the Imperial Regalia.³⁸ The opening of the *Heike Monogatari* hints at the workings of karma in this matter: the Taira aspired to a place that was not theirs and paid the price for it.³⁹

³³ Kuroda, 'Kokka to Tennō', pp. 275–76.

³⁴ Mattner, 'Der Falke als Symbol', p. 87.

³⁵ The character for Taira 平 can be read as Heike 平家, when combined with the sign for house or family 家. Hence, both readings describe the same family.

³⁶ Compare Wakabayashi, 'Disaster in the Making'.

³⁷ Souyri, *Upside Down*, pp. 29–46.

³⁸ Ichiko, *Heike Monogatari*, pp. 401ff.

³⁹ Watson, *The Tales of the Heike*, p. 9.

CONCLUSION

As has been shown, non-symbolic arguments can be made that justify the rarity of blades in the *kogarasumaru-zukuri* style, yet none of them can really explain the low number of blades. The symbolic dimension, however, carries enough weight to be a plausible argument. Assuming that the *Kogarasumaru* was meant to represent the Imperial Regalia, ownership of it would bolster the claim of the Taira to be the most prominent family in Japan at the time, but would equally come to represent their hubris. The loss of the Regalia and the death of Antoku Tennō show the price of their hubris, and accompany their downfall, necessitated by karma. Thus, the *Kogarasumaru* would be guilty by association; hence anyone who constructed or used such a blade would invite evil karma into their life.

As history is written by the victors, we can safely assume a demonisation of the Taira's actions by their victorious successors, who started off exactly where the Taira stood during the height of their power. This strengthens the proposed thesis, as no one would want to antagonise the new rulers by openly presenting anything resembling the heirloom of their mortal enemies.

More detailed research into contemporary accounts will be necessary to ascertain the idea of the *Kogarasumaru* serving as a stand-in for the Imperial Regalia. Until this is accomplished I hold the proposed thesis to be the most reasonable explanation for the rarity of this type of blade. Furthermore, this sheds new light on the power structures and relations in medieval Japan, which also merit further study.

“j. veel feble fauchon dil anxien temps.”

*The Selection of the Falchion as Symbol of Tenure:
Form, Function and Symbolism*

Robert W. Jones

THIS PAPER CONSIDERS THE symbolic significance of three falchions; the Conyers' falchion held at Durham Cathedral, the Pollard Falchion, no longer surviving but also connected with a Durham family, and a third referred to in a fourteenth-century inventory of the contents of Wigmore Castle. All three of these were being used as symbols of tenurial exchange, and the conveyance of land. The paper seeks to understand why such distinctive weapons were selected for the purpose, and argues that far from being random selections, the falchions were chosen because of their peculiar form and the symbolism and cultural associations which this engendered.

SYMBOLS OF CONVEYANCE

When Edward II's officers put together an inventory of the goods and chattels left by Roger Mortimer in his castle and the abbey of Wigmore after his rebellion in 1322, everything was listed down to bed linen, the cruets, even the peacock.¹ Amongst this collection of aristocratic bric-a-brac, in the keeping of Wigmore Abbey and sandwiched between “four books of romances” and “one coffer containing charters, deeds and other records”, is recorded “one brass horn that with a certain falchion is said to be the charter of the land of Wigmore”.²

Such symbols of conveyance are not unusual. A wide variety of objects either has survived or is recorded as being used to mark grants. There is a long tradition of so-called “tenure horns”, such as the “Pusey Horn” held in the Victoria and Albert museum with its early fifteenth-century inscription recording it as being token of a grant by King Cnut to William

¹ The series of inventories taken of Wigmore are held at the National Archives, E163/4/48 (2e), E101/333/4 and E372/179 (22.d), and at the British Library Add. MS 60584. My thanks to Barbara Wright for permission to use her transcription work.

² “Uno cornu eneo quod cum quoddam Fauchone est ut dicitur Carte terre de Wygemore.” In the initial inventory of 1322, E 154/1/11B and “j. veel feble fauchoun dil anxien temps” in the inventory taken in 1324, E163/4/48 (2a).

Pusey.³ Knives are also common tokens. Such objects served as a tag for a memory in the “pre-literate” period, the transfer of the object being a physical act that could be watched and remembered at the same time as the words of the transfer were heard and remembered.⁴

Whilst knives seem to have been common symbols of conveyance, swords were not. Clanchy provides three examples of swords being used in a symbolic form connected with land ownership. He repeats Walter of Guisborough’s famous account of how Earl Warenne, attending Edward I’s *Quo Warranto* proceedings, presented an ancient and rusty sword as proof of his right; the sword by which his ancestors had gained their lands, fighting alongside Duke William in the Conquest.⁵ He tells how in the 1130s the knight Thomas de Muschamps, becoming a monk at Durham shortly before death, laid his sword on the altar as a remembrance when he invested the house with his estate at Hetherslaw.⁶ Finally, he records how the royal treasury held the sword that was miraculously provided by St. Odo of Canterbury to the English king Athelstan at his victory over the Scots at Brunnanburh in 937.⁷

None of these examples are really what might be called a charter sword. Warenne’s rusty weapon was a symbol of the role of his ancestors in the Conquest, and the longevity and status of his family, rather than a token of remembrance for the obtaining of a particular piece of land. De Muschamp’s sword was as much an indication of his forsaking his status as *miles strenuus* as it was about the gift of Hetherslaw to Durham. Nor is the Athelstan sword symbolic of a specific land transfer. Rather it is a miracle story, and its presence in the royal treasury more akin to the collection of heroic mystical swords gathered by Angevin kings that included Roland’s *Durendal* and Arthur’s *Caliburn*.⁸ The abbey at Battle held a sword purporting to be that of William the Conqueror, who founded the institution in commemoration of his victory in 1066, but the earliest that it can be dated to is around 1417.⁹ Even if the sword was that of the Bastard, it is still not being used as an object of tenure. The sword as charter is in fact highly unusual. What is even more unusual with regard to the Wigmore inventory, however, is the type of sword being used.

THE CONYERS’ POLLARD, AND WIGMORE FALCHIONS

The falchion has a very distinctive form.¹⁰ It is generally shorter than a “knightly” sword; the broad, single-edged blade being on average between eighteen inches and two feet (45

³ On tenure horns see Cherry, ‘Symbolism and Survival’, pp. 111–18.

⁴ Clanchy, *Memory to Written Record*, pp. 35–43 and 54–60.

⁵ Ibid, pp. 36–38. The original account appears in *The Chronicle of Walter* (Rothwell, ed.), p. 216.

⁶ Ibid., p. 39.

⁷ Clanchy, *Memory to Written Record*, pp. 40–41.

⁸ Mason, ‘Invincible Weapon’, pp. 121–38.

⁹ Paton, ‘Notes’, pp. 462–75 and pls XV and XVI.

¹⁰ Relatively little work has been done on the falchion, and there is no single extensive treatment of it. For general overviews, see Blair, *European and American Arms*, pp. 4–10; Hawkins, ‘Meat

to 60 centimetres) in length. Traditionally, two distinct blade forms were identified; one – typified by the Conyers’ falchion I shall discuss below – has a more or less straight blade that broadens towards the tip which is clipped, in a similar way to a modern cleaver or machete. The second has a curving blade and ends with a cusped point. Since it looks very much like a scimitar it is often described as “oriental”.¹¹ However, recent work by J. G. Elmslie identifies five distinct types and seventeen sub-types. Survivals are rare, with maybe only forty extant examples.¹² The frequency of their appearance in period art belies this rarity, however, yet it remains a distinctive weapon, and in the context it is found here, something of an oddity.

By itself, the Wigmore reference might be discounted as a mere curiosity, an aberration merely adding an extra layer of interest to a fairly common example of a tenure horn. But there are two other examples that can be produced of falchions appearing as “charter weapons”.

The first is a well-known and indeed, uniquely well-preserved example of its type. The Conyers’ falchion, now housed in the cathedral treasury of Durham, was owned by the Conyers family who presented it to the Bishop of Durham on his first arrival in the diocese.¹³



FIG. 1: Conyers’ Falchion.

Cleaver’; McPeak, ‘Falchion’; Oakeshott, *Archaeology of Weapons*, pp. 235–38; Seitz, *Blankwaffen I*, pp. 188–97.

¹¹ Blair, *European and American Arms*, p. 5; Hodges, ‘Conyers Falchion’, p. 214; Oakeshott, *Archaeology of Weapons*, p. 238. As we shall see, the suggestion of an eastern European or Middle Eastern origin for the falchion is almost certainly erroneous.

¹² I am most grateful to J. G. Elmslie for his comments on an early draft of this paper, and for sharing his typology, ahead of its publication in the exhibition catalogue: Grotkamp-Schepers et al., *Schwert*.

¹³ See Sir Edward Blackett and Baron de Cosson’s letters in *The Proceedings of the Society of Antiquaries of Newcastle-upon-Tyne* April and May 1891, bound as ‘The Conyers Falchion’ in *Armes*

In return they retained possession of the manor of Sockburn. Whilst the ceremony is first recorded in an inquest post-mortem for Sir John Conyers (the fourth of this name), dated to April of 1395/6, the sword itself is of a style of the mid-thirteenth century, dated by reference to similar sword forms seen in period visual depictions, including the mid-thirteenth-century Westminster Painted Chamber.¹⁴ This dating is reinforced by the identification of the heraldic decoration on its pommel – *gules three lions passant gardant or* on one side and *or, an eagle displayed sable* on the other – as the arms of the Plantagenet kings of England after circa 1198 and Henry III's brother Richard of Cornwall as King of the Romans respectively.¹⁵

The legend attached to the sword, which was current in the early seventeenth century when the antiquarians were doing their rounds, says that in 1063 the first Sir John Conyers slew a "wyrme" that had been terrorising the people of the area. The grateful bishop granted him and his heirs the manor in perpetuity, and the presentation to the incoming bishop of the sword which had slain the beast was a ritual reminder of the act. The truth of the matter appears to be that Bishop Ranulph Flambard granted the land to the Conyers family sometime between 1099 and 1128. They are recorded as being enfeoffed with Sockburn in a confirmation charter dated to 1128~35, and may well have been the original Domesday tenants. By the 1170s they held land for seven and a half knights, making them major players in the Palatinate-Bishopric.¹⁶

The second example, known as the Pollard falchion, is very similar in many ways to the Conyers' weapon. The Pollards were also a Durham family holding a collection of properties, the tenure for which was to present a falchion to the incoming bishop on the first occasion he crossed their lands.¹⁷ As with the Conyers family a myth had grown up by the seventeenth century that an early scion of the family had killed the beast ravaging the region, although the beast was a great boar rather than a dragon.¹⁸ Again, they were granted land by a grateful bishop, and the sword presented was the weapon that had slain the beast. Just as with the Conyers' falchion, the Pollard sword is first attested to in an inquest post-mortem, this time of John Pollard's widow Dionisia in 1400, in terms strikingly similar to that of the Conyers' record.¹⁹

The documentary evidence shows that the land connected to the falchion ritual – some fifteen acres next to Auckland Park – was in fact granted to the family by the Bishop of Durham sometime in the thirteenth century.²⁰ Unlike the Conyers, the Pollards were not a landed family from the time of the Conquest. Rather they appear to be serving in

and *Armures* (Royal Armouries Library 03984); Hodges, 'Conyers Falchion', pp. 214–17; Wall, 'Conyers Falchion', pp. 77–83.

¹⁴ For the Painted Chamber see Hewitt, *Ancient Armour*, pl. 82, p. 313, taken from *Vestuta Monumenta*, pl. xxxvi.

¹⁵ Blackett and de Cosson, 'Conyers Falchion', p. 2; Liddy, 'Land, Legend and Gentility', p. 91; Richard, Earl of Cornwall was crowned King of the Romans in May of 1257.

¹⁶ Aird, *St Cuthbert*, pp. 207–13; Hodges, 'Conyers Falchion', pp. 214–17.

¹⁷ Blackett and de Cosson, 'Conyers Falchion', p. 2; Liddy, 'Land, Legend and Gentility', p. 89.

¹⁸ Liddy, 'Land, Legend and Gentility', p. 92.

¹⁹ *Ibid.*, pp. 89–90.

²⁰ *Ibid.*, p. 77.

the episcopal household. They managed the bishop's estates in the Auckland area from a townhouse base on the market square in Bishop Auckland itself, and acquired a patchwork of lands in the area as they became available.²¹

There is no similar myth attached to the Wigmore falchion, no Mortimer equivalent to the Conyers' or Pollard's illustrious dragon- or boar-slaying ancestors. The fourteenth-century Wigmore Chronicle, which sets out to establish the Mortimer's pedigree, records that Ralph de Mortimer, seigneur de Saint Victor-en-Caux, was granted Wigmore by capturing the English landholder Eadric *Silvaticus* (Eadric "the Wild", also known as Eadric Cild), who rebelled against William in 1070.²² In actuality, Domesday records the castle of Wigmore as being built by William FitzOsbern, on "waste" that had been held by Gunnfrothr in the reign of Edward the Confessor.²³ The sequence of events is wholly unclear; it may be that Ralph Mortimer was involved in defeating Eadric – he certainly received the latter's lands in Hampshire, Leicestershire and Warwickshire (although not those in Herefordshire and Shropshire). It is also possible that he was involved in subduing the "Revolt of the Earls" of 1075, which included FitzOsbern's son Roger de Breteuil, Earl of Hereford. It seems most likely that it was after Roger's dispossession and imprisonment that Wigmore came into the Mortimer family's hands.²⁴ By the fourteenth century, the events have become conflated.²⁵

WHY THE FALCHION?

So, we have three families, each of whom appear to have memorialised their acquisition of territory with a falchion. Why did these families chose to do so? Why a blade at all?

The answer to the latter question would appear a simple one. These are conquest lordships; the land coming to the family's possession through a deed of arms. The Conyers' vanquishing of a dragon, the Pollards' slaying of a great boar and Mortimers' defeat of Eadric the Wild: all are tales of martial victory. Like the Earl Warenne, they may have felt it was right and proper that their possession should be recorded by something more martial than just a knife or a cup or horn. Even if we have to discount the dragon-slaying and giant boar stories of the former two as myths, one could easily propose that they are embroidered tales of half remembered victories over Norse raiders or outlaw bands. It is tempting to extrapolate a dragon from dragon-prowed ships, and a boar from boar-topped helmets like those described in *Beowulf*, in order to rationalise the mythic tales.

²¹ Ibid., pp. 83–84.

²² Dugdale, *Monasticon Anglicanum*, 1693 (ed. Caley et al.), pp. 348–49.

²³ *Domesday Book* (ed. Williams and Martin), p. 506.

²⁴ My thanks to Carol Davidson Cragoe for the opportunity to read her chapter on the history of Wigmore for a forthcoming volume on the 1998 excavations.

²⁵ Carol Davidson Cragoe, pers. com. 19.04.2013.

Such ideas are overly romantic however. Besides, such a theory ignores the fact that despite the myths, the Pollard's and Conyers' lands were not conquest tenures at all but grants from a grateful bishop in recognition of service within the episcopal administration.

The Pollard falchion may quickly be accounted for. As Liddy suggests, the Pollards were never a top-flight noble family. Like so many of the gentry families coming to prominence in the late thirteenth and fourteenth centuries, they were episcopal clerks and administrators who had made good.²⁶ Although not of the same social class there are links between them and the Conyers family, unsurprising in the closed society of the Durham bishopric. It is almost certain that the two families knew each other; members of both families appear on the same witness lists.²⁷ It would appear that the Pollards' use of the falchion as a signifier of tenure was most likely a conscious aping of the Conyers family, attempting to acquire a similar standing and status by creating for themselves an ancient and heroic genealogy.²⁸

The Mortimer holding of Wigmore does seem to have been gained by right of conquest, although whether it can be tied to a defeat of Eadric the Wild or of the Earl of Hereford is less clear. If we can argue for the moment that it is Eadric's dispossession that sees the Mortimers in receipt of the land of Wigmore, then one might argue that this provides the key to the question of why the weapon used here, and in Durham, is not a knightly sword but a falchion.

Is it possible to accept for the moment that the weapon that becomes the charter of the lands of Wigmore is that of Eadric *Silvaticus*? Might not the horn, examples of which are often seen as a tenure objects connected to forest land and as a badge of office connected with foresters, be a link to Eadric as *Silvaticus*, one of the "wild men" who took to the forests and marshes in their rebellion against the Conqueror and his sons?²⁹ If so then it might be possible to argue that the "falchion" recorded in the inventories was in fact a seax. These knives were of a distinctive shape, broad-bladed and single-edged, the larger ones often having a clipped tip. They are found in the archaeological record of northern Europe and Scandinavia from the sixth century through to the last decades of the eleventh. Whilst some are the size of ordinary knives there is also a variant, inventively named the "long seax", that has blades of up to two feet in length.³⁰ They are in many ways comparable to the later falchion and, indeed, a number of commentators have suggested that the mid-thirteenth-century falchion is in fact a descendant of the early medieval seax.³¹ Such a derivation is

²⁶ Liddy, 'Land, Legend and Gentility', p. 89. On the development of the administrative gentry, see Keen, *Origins*.

²⁷ Liddy, 'Land, Legend and Gentility', p. 91.

²⁸ *Ibid.*

²⁹ Cherry, 'Symbolism and Survival', *passim*. There is an effigy of a forester-knight at Pershore in Worcestershire (see Coss, *Knight in Medieval England*, p. 76). On the use of the suffix *silvaticus* for Norman rebels see Ordericus Vitalis, *Ecclesiastical History*, (ed. and trans. Chibnall), pp. 216–18 and Reynolds, 'Eadric Silvaticus', pp. 102–5.

³⁰ Oakeshott, *Archaeology of Weapons*, pp. 117–19. The two key typologies for these weapons are Schmitt, *Alamannen*, pp. 33–35 and Wheeler, *London and the Saxons*.

³¹ Blair, *European and American Arms*, p. 5; Oakeshott, *Archaeology of Weapons*, p. 235; Wall, 'Conyers Falchion', p. 80.

unlikely however. Elmslie's work shows that the falchion first appears in southern Europe around the 1240s, a good century and a half after the seax falls out of favour, and he argues for a form of convergent evolution rather than direct descent.³²

It would seem plausible to argue that the "*veel feble fauchoun dil anxien temps*", as the object is recorded in the 1324 Wigmore inventory, was perhaps the seax of Eadric the Wild; the weapon of the defeated Englishman being held by the Mortimers as a token of their role in the capture of the land, either directly from Eadric himself or because of their involvement in putting down the rebellion of the Earl of Hereford.³³ The change in terminology need not worry us; the old English word seax had fallen out of use well over a century before the inventories were penned. The clerk performing the inventory would have seen a broad-bladed, single-edged weapon (albeit in a poor state of repair) and recognised it as a falchion, a term in common use at the time.³⁴

What of the Conyers' falchion? The weapon that sits in the Cathedral treasury is most definitely not a seax misnamed. It is neither the weapon that the fabled John Conyers used to slay the dragon, nor is it a token that Bishop Flambard might have been presented with by the Conyers as a symbol of tenure in the early twelfth century. As has been said, it is clearly a weapon of the mid-thirteenth century or later.

The most obvious answer here is that it is a replacement for the original symbolic object; a bright, new shiny sword to replace a rusty and tarnished "*veel feble fauchoun dil anxien temps*".³⁵ One can almost imagine Sir Humphrey Conyers, head of the family around 1260, preparing for the arrival of the new Bishop Robert Stichell, saying "We can't give the new bishop this old thing" and commissioning a new weapon to be made.

The arms displayed on either side of the pommel are also suggestive of this renewal of motifs. There is little indication that the arms are copied from an older exemplar; the leopards and the eagle on the other face are both executed in a distinctively thirteenth-century style, and the three leopards charge was not adopted by the English monarchs until the very end of Richard I's reign.

Whilst the lion decoration is quite clearly linked to the Plantagenet royal house, the eagle charge is a more difficult one to pin down. The suggestion which is generally accepted is that the arms are those of the King of the Romans (the title given to the Holy Roman Emperor prior to his coronation by the Pope) which, when combined with the stylistic evidence and the use of the English royal arms has been taken to indicate some form of link with Henry III's brother Richard of Cornwall.³⁶ Most commentators have simply suggested that the eagle's appearance is simply part of the Conyers' self-aggrandisement; the family displaying

³² Indeed the weapon need not be a seax *per se*; around forty per cent of "Viking" swords are actually single-edged (Petersen, *De Norske Vikingsverd*, (trans. Noer); Elmslie, pers. com. 12.10.2015).

³³ "*j. veel feble fauchoun dil anxien temps*." TNA E163/4/48 (2a).

³⁴ On similar variations in the use of technical terms in a military context see Ayton, *Knights and Warhorses*, pp. 62–69.

³⁵ Liddy, 'Land, Legend and Gentility', p. 91 suggests that the falchion is a more prestigious artefact bearing the royal arms and those of the Holy Roman Empire, but not that the original token was also some form of sword.

³⁶ Blackett and de Cosson, 'Conyers Falchion', p. 2; Liddy, 'Land, Legend and Gentility', p. 91.

some notional link to Henry III and his family. Whilst it was common for families to display the arms of major noble and even royal houses alongside their own in order to suggest a connection between them, basking in the reflected prestige, there is generally some tie of blood or service, no matter how tenuous.³⁷ As yet no one has been able to draw a link between the Conyers family and either Henry III or Richard of Cornwall.³⁸

Another suggestion has been that the eagle is in fact the attributed arms of Leofric of Mercia, grandfather of Morcar of Northumbria, and therefore of Morcar of Northumbria himself.³⁹ In this case the heraldry is not original – there was no such thing in the 1070s – but is attributed to the earl, in the same way in which we see the arms of Edward the Confessor and other figures from pre-heraldic antiquity being created in the thirteenth century.⁴⁰ If this interpretation of the arms is accepted then the decoration on the hilt refers not to the family's current ties to the royal house, but is instead an allusion to the pre-Conquest origins of the land they held. This in turn adds greater weight to the idea that the Conyers' falchion too might have been a replacement for a much older weapon, possibly a seax.

Whether or not one can accept the idea that the Conyers' falchion is a replacement for an earlier seax, the question still stands; why a falchion? Why not a knightly sword more befitting one of the senior noble families in the Palatinate?

If the falchion is a replacement for an older weapon of similar form then it is important that, as a visual cue for a particular memory, the new weapon retains something of the appearance of the old.

I would go further than this, however. There is something in the shape of the falchion that suggests antiquity. In medieval iconography the falchion is routinely depicted in the hands of ancients, whether biblical or classical. This practice becomes more pronounced in the Renaissance, when artists began to depict their classical subjects *al antiqua*, in a classical style, rather than the medieval practice of imprinting contemporary fashions on the past. The costume is not always any more accurate, and indeed often tends towards the exotic and fanciful. The artists were looking for a weapon that was similar to the Roman *gladius* – short and broad-bladed – but which also had an air of the exotic. Thus the falchion, usually with a curved and notched blade, became the roman short sword.

The other use of the falchion, iconographically-speaking, is to put it into the hands of "the enemy". Most obviously they are seen in the hands of Islamic foes where they become caricatures of the eastern *shamshir* or scimitar, with exaggerated curved blades and spines. In fact, Islamic weapons through to the late fifteenth century show only a mild curve; the extremely-curved, banana-shaped blade does not really appear until the sixteenth century, whilst the fat-bladed weapon beloved of Hollywood Harem guards and "oriental" cultists, I

³⁷ Coss, *Knight in Medieval England*, p. 91.

³⁸ Nor is there any clear evidence that Richard ever adopted the King of Germany's arms. He spent very little time in Germany, making only four visits between his election in 1256 and his death in 1272.

³⁹ Wall, 'Conyers Falchion', p. 78.

⁴⁰ Boutell and Fox-Davies, *English Heraldry*, p. 18.

would argue, owes more to the medieval depictions of western Europe than to any eastern survivals.⁴¹

In a similar fashion, falchions can be seen in the hands of the forces of Hell. In the romance *Robert le Diable* and its Middle English version *Sir Gowther* the anti-hero, born out of a pact between his mother and the devil, begins his career of wickedness by forging his own weapon: not a knightly sword but a falchion that only he can wield.⁴² The Douce Apocalypse of around 1270 depicts the horsemen described in the Book of Revelations chapter 9, verses 16–21 as knights riding lion-headed horses.⁴³ Two of the knights wield falchions. The rearmost, leaning back over his horse to strike at the men behind him, carries a wickedly serrated blade that mimics the tooth-filled grin on his face. The link between demonic forces, the outsider or “other”, and Muslims in medieval art and literature is a common and well-known one. It does not really explain why the falchion, however, with these connotations of wickedness, should be chosen as a token of conveyance in Durham.

The reason it is seen so often in the hands of the Devil and his hellish minions, I suspect, is that it is not a knightly sword, elegant of line and having the “austere perfection of line and proportion – surely the very essence of beauty” as Ewart Oakeshott puts it.⁴⁴ It is a weapon that looks brutal and unsophisticated: more like a butcher’s cleaver than a sword.⁴⁵ The form of the weapon informs its symbolism. With its broad blade and clipped point it looks like the sort of weapon that could be used to slay a dragon or a great boar.

This begs a final question; which came first, the dragon-slaying myth or the dragon-slayer’s weapon? One last piece of evidence can be brought in, but it is no more conclusive than anything else I have suggested. In Sockburn church is an effigy. At the knight’s feet a hound and a dragon are entwined in deadly combat. Legend identifies it as Sir John, the slayer of the Sockburn wyrm. It is not. The effigy’s pose and armour is typical of the 1290s to early 1300s. At his side hangs not a falchion but a typical knightly sword.

The falchions of the Conyers, Pollard and Mortimer families remain something of a curiosity and a mystery. As Clanchy says, “if the symbolism of knives were understood, much might become clearer about preliterate property law in Europe”, and thus it is with the falchion.⁴⁶ Perhaps, however, we have been able to suggest something of how the falchion’s form and function were reflected in the symbolism it acquired: an antiquity, a brutality, a mythical quality.

⁴¹ For a visual record of the form of oriental blades during the High Middle Ages see Nicolle, *Arms and Armour*.

⁴² Laskaya and Salisbury, *Middle English Breton Lays; Robert le Diable* (ed. Löseth).

⁴³ Douce *Apocalypse*, p. 31.

⁴⁴ Oakeshott, *Records*, p. 1.

⁴⁵ Drawing on Peter Johnsson’s recent thoughts on the influence of medieval ideas of spiritual geometry in the making of swords, Elmslie (pers. com. 12.10.2015) suggests that the falchion’s asymmetry makes it a profane weapon and therefore a suitable weapon for the non-Christian and the wicked. Johnsson himself suggests that the underlying message is one concerning wrath (pers. com. 19.11.2015). A further consideration of the symbolic significance of appearances of the falchion in medieval literature and imagery is to follow.

⁴⁶ Clanchy, ‘Literate and Illiterate’, p. 59.

The Way of the Northmen

The Development of the Norman Sword from Duke Rollo in Normandy to Emperor Frederick II in Sicily from the Tenth to the Thirteenth Century

Nicole Mölk

THIS PAPER MAINLY ADDRESSES the development of the sword in the period after the Norman conquests of Normandy and Sicily.¹ Emphasis will be placed on the influences of the different cultures.² The ceremonial sword of King Frederick II, currently kept and displayed in the Imperial Regalia in Vienna, will occupy the central position in my study. This extraordinary weapon represents the climax of art and craftsmanship of the many overlapping cultures on Sicily. Geographically situated in the middle of the Mediterranean Sea, the island is considered a “cultural melting pot”.³ Following the Phoenicians, Greeks, Romans and Byzantines, the Muslims occupied and dominated Sicily in the ninth century A.D. Two hundred years later the Normans established their rule over the island. This constant transition of different cultures has shaped Sicily not only politically but also religiously and economically. How this cultural melting pot can be exemplified on the basis of one single object shall be demonstrated based on the sword of Frederick II.

THE NORMAN CONQUEST AND ITS INFLUENCES ON MEDIEVAL SWORDS

The conquest of the north

In the tenth century (911) the Viking leader Rollo swept across West Francia, pillaging and plundering. As a peace-offering he received Normandy as a fiefdom from King Charles III.

¹ A comprehensive summary of the development of European swords can be found in Petri, ‘Europäische Schwertformen’.

² This relates to my PhD research (University of Innsbruck, Department of Archaeologies), focusing on this area of conflict between the Normans and Arabs. During his conquest of Sicily, Emperor Frederick II of the Hohenstaufen dynasty laid siege to the city on Monte Iato. The aim of my thesis is to give the last settlers on Monte Iato an identity and to create a basis for further research on the topic of medieval Iato.

³ Dittelbach, *Geschichte Siziliens*, preface.

Consequently, the Vikings settled down, renamed themselves “Normans” and brought not only their culture but also their weaponry to their new homeland.⁴ Although they were originally Vikings from Scandinavia, they prospered in their new homeland in northern France and in 1066 they even conquered England. Splendid sources concerning the Normans’ history are not only their buildings, many of which survive today, but also the writings of contemporary witnesses, and artwork like the Bayeux Tapestry, which colourfully illustrates the Norman invasion and conquest of England.

During their raids and conquests in the Frankish kingdom the Northmen came into contact with a form of warfare that was quite different from what they knew. The Franks under King Charlemagne were well known for their new way of fighting on horseback. Charlemagne created the first major European empire after the fall of Rome, and to ensure his advantage on the battlefield he surrounded himself with mounted warriors, the so-called *caballarii*. These new, elite soldiers, also known as *Scara Francisca*, fought with heavy lances, were clad in mail and used stirrups. This new form of cavalry was completely unknown to the Viking warriors.

Up to this point the Vikings used the shield wall as a tactic to fight against large armies, especially against Picts and Anglo-Saxons⁵ on the British Isles. In this type of warfare warriors formed mobile walls, standing side-by-side and joining or overlapping their shields. Standing in consecutive lines, the ones behind were able to push the wall forward and replace fallen warriors. Since there was no space for using a long sword in the front ranks, short *seaxes* were common. Only when the shield wall broke and it came to single combat did the Vikings draw their swords. Therefore, this sword type was not very long, but had straight edges, a rounded tip and was intended for cutting strokes. Since most of the swords of this time were used with one hand it was the perfect weapon to fight with a shield.

The modern term “Viking sword” is a little confusing as it implies that only Vikings used this type of weapon. In fact, all warriors of Northern and Western Europe used this sword form from the seventh to the tenth century, the Vikings themselves even for a slightly longer period. It would thus be more accurate to use the term “Viking Age sword”. The first attempt to classify the swords of this time was made by Jan Petersen in 1919.⁶ In his seminal study, Ewart Oakeshott expanded Petersen’s work to include high and late medieval swords. In more recent times Alfred Geibig developed a specified classification for the swords from Haithabu.⁷ It should be mentioned, however, that for the further description of Frederick II’s ceremonial sword, Oakeshott’s typology will be used (fig. 1).

Against Frankish warriors, the Viking shield wall proved to be rather ineffective. The open ground of northern France was perfectly suited for mounted warfare and the Frankish cavalry was able to shatter the Viking shield walls and pursue their enemies until they surrendered or died. In order to survive, the Northmen had to adopt the Frankish style of warfare and also their weaponry.⁸

⁴ See also Androschuk, *Viking Swords*; Peirce, *Swords of the Viking Age*.

⁵ See also Davidson, *The Sword in Anglo-Saxon England*.

⁶ Petersen, *De Norske Vikingesverd*.

⁷ Geibig, *Morphologische Entwicklung*.

⁸ Verbruggen, *Art of Warfare*, pp. 313f.

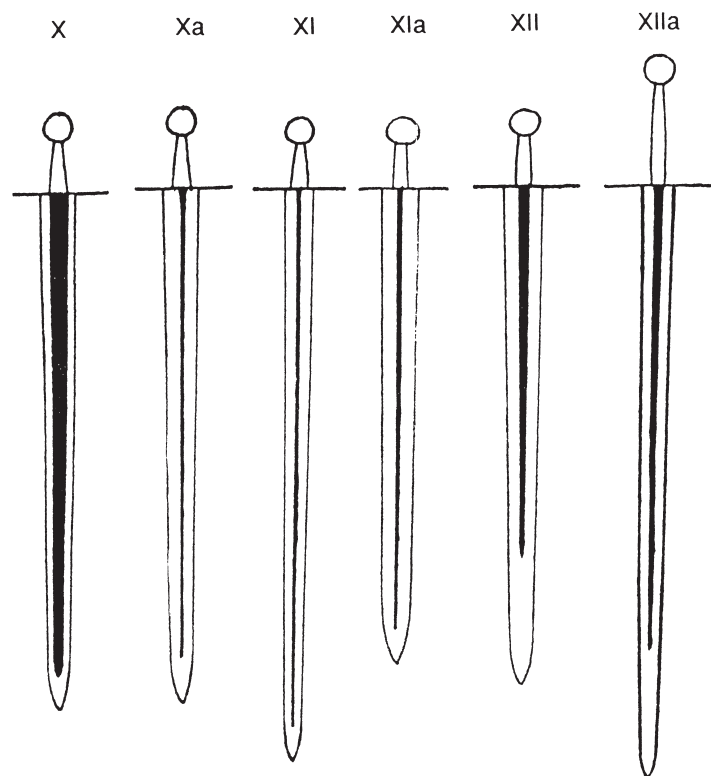


FIG. 1: Oakeshott typology X–XIIa.

By 911 at the latest, when Rollo became Duke of Normandy, the former Vikings and now Normans had adopted the Frankish *spatha* and optimised it for mounted warfare. This led to a transformation of the traditional Viking sword type. The new type X (fig. 1) is a classic blade design that was widespread throughout the late Viking Age and well in to the medieval period. This new type of sword features a distinctive pommel form, known as the brazil-nut style.⁹ The blade itself is very broad at the base, but comparatively flat. Furthermore, a wide and shallow fuller runs up the blade and ends close to the point, which is often rounded. Although type X looks heavy, it can be wielded easily and much more swiftly than one would expect, due to its intelligent design. Like the previous swords of the Viking Age the blade is clearly designed for a cutting stroke.¹⁰

In contrast to many Viking Age sword guards, which are very short and often richly adorned, the guards of the later examples of type X look unspectacular. The sword guard consists of a long, simple vertical bar with a slight swelling in its centre section. In this small detail it is possible to recognise the transformation of warfare.¹¹ Until the late tenth century

⁹ Oakeshott, *Age of Chivalry*, pp. 28ff.

¹⁰ Oakeshott, *Records of the Medieval Sword*, p. 23.

¹¹ Warzecha, 'Form folgt Funktion', passim.

there was no use for a long guard because it was not common to fight sword against sword. Instead, the round shield was used to deflect enemy blows.¹²

With the introduction of mounted warfare, the famous Norman shield was developed. As we can see on the Bayeux Tapestry (second half of the eleventh century), this shield was almond-shaped and meant to protect the rider's left flank. Due to its size it was not possible to swing it to the other side of the saddle quickly to deflect enemy weapons. So the type X sword (fig. 1) was equipped with a long and slender guard to protect the knight against this hazard.¹³ Due to this transformation of the sword form, the shape of the weapon began to look like the symbol of Christianity – the Cross. This resemblance would later be welcomed by the Church.

This brief introduction may sufficiently explain the changes that the northern conquests of the Normans caused in their forms of warfare and consequently their sword making. But to explain the phenomenon of the ceremonial sword of Frederick II we also have to take a look at the south.

The conquest of the south

In addition to the conquest of England, the Normans also travelled to Southern Italy and settled there at the beginning of the eleventh century. At this time Sicily was still under Arab control. Islamic rule over the island began in 902 and the Emirate of Sicily lasted from 965 until 1061. The island was the primary Muslim stronghold in Italy. The Muslim raids were part of a larger struggle for power in Italy and Europe, with Christian Byzantine, Frankish, Norman and local Italian forces also competing for control.¹⁴

The first Normans who conquered Sicily were Robert and Roger I in May 1061. After a long period of wars and turmoil, Roger II abolished the Muslim government in 1127, replacing it with Norman officials. The Arab dominion over Sicily had come to an end, and the Normans settled on the island and created a new empire. But even having come under Christian rule, the Muslim population in Sicily continued to play an important role in the socio-economic life of the island as merchants, craftsmen and farmers, in spite of their changing environment.¹⁵ Until the end of the twelfth century the population of the western part of the island remained Muslim, with the exception of the cities of Palermo and Mazzara. An account of this is given in the history of the diocese of Agrigento (written at the end of the thirteenth century): *pauci Christiani erant ibi usque ad mortem regis Guillelmi secundi*.¹⁶

¹² Oakeshott, *Age of Chivalry*, pp. 26–29.

¹³ *Ibid.*, p. 28.

¹⁴ See also Gravett, *Norman Knight*.

¹⁵ Metcalfe, 'The Muslims of Sicily', p. 292.

¹⁶ "There were few Christians until the death of King William II", translation by the author. Collura, *Le più antiche carte*, p. 304; Maurici, 'Uno stato musulmano'.

In 1140, Southern Italy was unified under the Normans.¹⁷ In the years 1220/21 serious guerrilla warfare began. The Muslims had selected the mountainous regions on the west of the island and along the Tyrrhenian coast to organise their resistance against the Christian rulers. According to the chronicler Riccardo San Germano their leader was called Mirabetto, which derives from the name Ibn Abbad. During his time as leader of the Muslims Abbad received the title *Amīr al-Mu'minīn*.¹⁸

From 1215 until his death in 1250, Frederick II, son of Constance of Hauteville,¹⁹ was King of Sicily, and from 1220 onward, he also held the title of Holy Roman Emperor. Under his reign the last Arabian resistance on the island came to a bloody end.²⁰ The rebel leader *Amīr al-Mu'minīn* was beheaded in Palermo and the entirety of Sicily now belonged to Frederick II's empire.

In movies, TV shows, and also in some "not-so-accurate" historical publications illustrating the pre-crusades period, the Arabs are often seen to be equipped with a kind of curved sword, the so-called "scimitar". In fact, the curved and single-edged scimitar did not arrive in the Mediterranean area until the late thirteenth century. Instead, the tenth- and eleventh-century Arab sword looked pretty much like its European counterpart: long, straight and double-edged. The only difference can be found in the composition of the hilt. The guard was sometimes slightly bent towards the tip, and the pommel was often made of bronze. In general, the pommel was much lighter than European ones and often hollow. This boosted the ability of cutting with the blade.²¹

Another difference was the Arab habit of adorning their weapons with a unique technique, an important part of their sword culture. The adoption of this technique is exemplified on the scabbard of the ceremonial sword of Frederick II.

THE HERITAGE OF EMPEROR FREDERICK II

Frederick II's coronation vestments

Like most of the important items of the precious coronation vestments of Frederick II, the ceremonial sword was crafted by the royal workshop at the court of Palermo. The era of the Hohenstaufen dynasty in Sicily was famous for its unique artwork, which was inherited from the Norman kings. The Norman garments, especially those for the coronation, were made by workmen in Palermo during the twelfth century. The workshops were especially famous for their fine textiles, considered even more important than their goldsmiths' work.²²

Byzantine and Arabian silk manufacturers worked in Palermo,

¹⁷ Loud, 'Normannische Eroberung Süditaliens'.

¹⁸ Prince/Ruler of the faithful; Vanoli, *Sicilia musulmana*, pp. 214–16.

¹⁹ Daughter of the Norman king, Roger II of Sicily.

²⁰ See also Kelly, 'The Normans'.

²¹ Nicolle and McBride, *The Normans*, p. 10.

²² Fillitz, *Insignien und Kleinodien*, p. 23.

[...] where happiness and honour, prosperity and accomplishment, the merit and the distinction have their seat, here in the royal workshop. Here were established good acceptance and a wonderful prosperity, great generosity and high gloss, fame and magnificent endowments. The fulfilment of hopes and wishes may enlighten everyone, here where the days and nights may go along in pleasure without an end and without a change in honour, loyalty and promotional participation in happiness and in the preservation of welfare, support and activity.²³

Thus reads the hymn to Palermo's royal workplaces. It is written in Arabic letters on the coronation mantle of King Roger II which was produced in 1133/34.²⁴ Apart from the mantle, this workshop also produced an alb, a dalmatic, stockings, gloves, shoes, and a girdle for the Imperial Regalia. The alb and the stockings probably once belonged to William II and the gloves to Queen Constance.²⁵

In these magnificent robes, Frederick II was crowned Emperor by Pope Honorius III. The shape and colour of the robes are similar to the garments of the Byzantine emperors. The Norman kings in Sicily competed with Byzantium not only by means of clothing, but with the entire range of artistic practice. Therefore, they also brought important master craftsmen to the island.²⁶

Frederick II's ceremonial sword

This can also explain the special techniques used for the scabbard of Frederick's coronation sword: the application of gold plates to a linen base. This linen base leads to a reduction of the scabbard's overall weight. Double rows of pearls frame the rhombic enamel plates in a manner that is typical of contemporary Palermitan clothing. Also characteristic for Palermitan workshops is the small vermicular filigree pattern that occupies the triangular spaces, while the *champlevé* technique seen on the enamel plates is characteristic of Byzantine craftsmanship. The imperial eagles on two of these plates are among the first manifestations of this heraldic motif from the Hohenstaufen period. The one-headed eagle of the Holy Roman Empire and the lion of the Kingdom of Bohemia are visible on the pommel (fig. 2), which was produced during the reign of King Charles IV in the fourteenth century in Prague, while the rest of the sword was manufactured in Palermo.²⁷ It is very striking that the eagle on the scabbard, which was produced in the thirteenth century (92.5cm long²⁸) resembles the stone eagle in the throne room of William I in the Norman Palace of Palermo.

²³ Ibid., p. 24, translation by the author.

²⁴ Ibid., pp. 23–24.

²⁵ Ibid., p. 24.

²⁶ Fillitz, *Insigien und Kleinodien*, p. 25.

²⁷ Kunsthistorisches Museum Vienna, *Secular and Ecclesiastical Treasures*, p. 173; Reiher, 'Die Reichskleinodien'.

²⁸ Kunsthistorisches Museum Vienna, *Secular and Ecclesiastical Treasures*, p. 173; Seitz, *Blankwaffen*, p. 148.

Norman architecture and artistry were also deeply influenced by Arabic culture. The most impressive artwork of this period can be seen in the sacral architecture in the cathedral of Monreale, or the Palatine Chapel in Palermo.²⁹

But not only was this influence seen in the architecture: the sword smiths of Palermo also adopted Arabic sword culture. A splendid example of this is the sword of Boabdil,³⁰ from the fourteenth century, with its highly decorated scabbard in the Arab style. It is slightly younger than the ceremonial sword, but perfectly shows the rich decoration on the scabbard seen in traditional Arabian weapons. With regard to Frederick II's ceremonial sword, we can determine that the guard and the hilt were also richly adorned. The guard (fig. 3) consists only of a short bar with a rectangular cross-section, but it is covered with gold foil and is colourfully enamelled with geometric patterns. The hilt shows the same idea of a rectangular bar which slightly tapers towards the pommel, while its surface is structured with slanting stripes of alternating plain and embossed surfaces.

The ceremonial sword is a masterpiece of Sicilian sword making. With a length of 108.5cm³¹ it belongs to Oakeshott type XII (fig. 1), dated between around 1180 A.D. and 1320. It has a large blade, with a shape very similar to the Ulfberht swords, but possesses a more acute point as well as a well-marked and slightly narrower fuller, starting in the tang and running about halfway down the blade. The fuller consists of two parallel grooves. A prominent smithery mark in form of a cross can be seen on the blade.³²

The disc-shaped pommel is similar to type J.³³ The small faces with hollowed-out chamfers of the disc widen to the radius of the pommel. They were popular from the mid-thirteenth century to the mid-fifteenth century. The guard is of Oakeshott style 3³⁴ and consists of a relatively short bar with a rectangular cross-section. This style enjoyed its first period of popularity in the twelfth and thirteenth centuries and then again in the fourteenth and fifteenth centuries. To summarise, Frederick II's ceremonial sword belongs to Oakeshott's sword-family C. This family extends from c.1100 to 1360, with many examples from after 1250.³⁵

The ceremonial sword finds a close parallel in the richly decorated, so called "Sword of Santa Casilda" in Spain, which is also an Oakeshott type XII from the thirteenth century.³⁶ There are innumerable sculptures and manuscript paintings showing swords of this type. A marvellous example is the sword held by a magnificent statue of Count Dietrich von Brehna, one of the benefactors of Naumburg cathedral, made in about 1265. Its pommel is one of the rarer types. Another example is a sketch made of the now lost twelfth-century effigy

²⁹ See also Stefano and Cadei, *Federico e la Sicilia*.

³⁰ As Muhammad XII he was the last Emir of Granada (1482–92).

³¹ Kunsthistorisches Museum Vienna, *Secular and Ecclesiastical Treasures*, p. 173.

³² Oakeshott, *Age of Chivalry*, pp. 37–41.

³³ When describing the shape of the sword, I am following Oakeshott's typology; Oakeshott, *Age of Chivalry*, pp. 80–112.

³⁴ *Ibid.*, p. 114.

³⁵ Oakeshott, *Records of the Medieval Sword*, p. 12.

³⁶ Kelly, 'Oakeshott XII'.



FIG. 2: Detail: Scabbard and pommel of Frederick II's ceremonial sword.



FIG. 3: Frederick II's ceremonial sword.

of William Clito (died 1127), Count of Flanders and son of Duke Robert of Normandy.³⁷ Another type XII example can be found in the Cathedral of Palermo, dating to about 1170.³⁸

CONCLUSION

In summary, it is very difficult to date medieval swords based solely upon their shape. Ewart Oakeshott has already warned "[...] how risky it is to attempt to date a medieval sword by its form alone, without the supporting evidence of a find-context, or identifiable (or at least datable) marks".³⁹

This can also be exemplified by the ceremonial sword of Frederick II. On closer examination the sword is more than a weapon forged for a single purpose, which was the coronation of Frederick II as Holy Roman Emperor in 1220. It seems that the sword's maker may have used an already existing, older blade for the ceremonial sword. The blade is certainly of high quality but not newly forged. It is possible that the blade is of German origin and was brought to Sicily by Frederick II. This theory seems probable due to the blade's surface, which shows traces of re-sharpening and overgrinding. Neither would be expected to occur on a sword used solely as a status symbol.

The sword makers in Palermo produced a richly decorated guard, hilt, and probably also a pommel to complement the style of the blade. Since the pommel was replaced during the reign of Emperor Charles IV we do not know what the original looked like. A kind of wheel-shaped pommel is to be expected. The surviving fittings consist of a blend of Arab, Norman and German influences. The splendid scabbard especially shows distinct Muslim influences; the one-headed eagle is of course the sign of the Roman King or Emperor, but the rest of the arrangement could be of genuine Arabic provenance.

The royal workshop in Palermo used some old parts and added some new ones, which, due to their unique style, could only have been created in Sicily. Because of the influence of diverse cultures, a unique cultural area was formed on the island, whose art of sword making culminated in the ceremonial sword of the Holy Roman Empire. Frederick II's sword was forged in a time of cultural transformation and marks the fusion of different cultures in Southern Italy.

³⁷ Oakeshott, *Age of Chivalry*, p. 40.

³⁸ Oakeshott, *Records of the Medieval Sword*, p. 68.

³⁹ Ibid.

IV

Fighting and Swordsmanship

Researching Bronze Age Swordsmanship

Experiments and Wear Analysis

Raphael Hermann, Andrea Dolfini, Rachel J. Crellin
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THIS PAPER DISCUSSES SOME preliminary results of the ongoing “Bronze Age Combat” project, which aims to reconstruct the fighting styles used in Late Bronze Age Europe (c.1200–800 B.C.) by linking the impact marks visible on archaeological swords, spears and shields to specific combat actions including strikes, blocks, stabs and throws. The research problem is being investigated through an innovative combination of experiments with replica weapons and wear analysis of archaeological weapons. The paper focuses on our sword research, paying special attention to field test methodology, the classification of combat marks generated during our experiments, and the wear analysis of a sample of archaeological swords from the Great North Museum: Hancock (Newcastle) and the Yorkshire Museum (York). The experimental and archaeological marks are then compared and contrasted with each other. This enables us to put forward original observations regarding swordsmanship and fighting practices in Late Bronze Age Europe.

For a long time, ideas of Bronze Age swordsmanship have been dominated by a number of misconceptions generated by a combination of early experiments with replica weapons¹ and a simplistic use of morphological analogy. This state of affairs finds its *raison d’être* in the history of twentieth-century archaeology, which focused on typology as the chief means for assessing the functionality of early metal objects.² Moreover, prevailing ideas of prehistoric Europe as a fundamentally pacified world hindered research into ancient violence and warfare, particularly in the wake of World War II.³

Academic interest in the practical uses of Bronze Age swords has arisen again in the last twenty years.⁴ Two principal strands can be isolated within this research tradition.

¹ E.g. Coles, ‘European Bronze Age Shields’.

² Gutiérrez Sáez and Lerma, ‘Traceology on Metal’, p. 171; Molloy, ‘Martial Arts and Materiality’, p. 117.

³ Keeley, *War before Civilization*; Molloy, ‘Introduction: The Evil Men do...’.

⁴ E.g. Armit et al., ‘Warfare and Violence’; Parker Pearson and Thorpe, *Warfare*; Ralph, *Archaeology of Violence*; Schulting and Fibiger, *Sticks, Stones and Broken Bones*; Thorpe, ‘Origin of Warfare’; ‘Warfare in the European Bronze Age’.

The first championed the examination of combat-related edge damage on archaeological objects.⁵ The second focused instead on experimentation with replica weapons as a method to study ancient swordsmanship as a body-centred practice, which could be accessed through experiential learning and object engagement.⁶ Both approaches have had a fundamental role in overturning previous assumptions regarding the uses of Bronze Age weaponry, despite them proving slow to trickle down into mainstream archaeological literature.⁷

Neither approach, however, is devoid of problems. On the one hand, examinations of combat marks have not been accompanied by targeted experiments to replicate them. This limits our understanding of the conditions in which edge damage was generated while also invalidating one of the central tenets of wear analysis.⁸ On the other hand, experiments with replica weapons have hitherto been based on an incomplete appraisal of the limits of analogy, which readily emerge when one tries to compare dissimilar weapons, or the differing social conditions in which they were utilised. Consider, for example, the differences in mechanical properties between steel and bronze, or the dissimilar circumstances in which historic and prehistoric fighting must have unfolded. Similarly, experimentation has not yet overcome the problem posed by historically contingent uses of material culture, which are predicated upon a relational synergy between a particular knowing body, a particular object, and the specific social conditions informing them both.⁹ To put it another way, socially distinctive ideas of what “fighting” is are as important for determining how a sword should be used as the material affordances of the weapon itself. It follows that, to be able to reconstruct Bronze Age swordsmanship, we need to broaden the scope of the analysis to include the social dynamics of prehistoric interpersonal violence.

THE BRONZE AGE COMBAT PROJECT

The “Bronze Age Combat” project was launched in 2013 in order to explore late second-millennium B.C. fighting styles in Europe. It investigates uses of Bronze Age swords, shields and spears based on an innovative combination of wear analysis and tests with replica weapons.¹⁰ It aims to understand how prehistoric bronze weapons were used, in what kind of combat situations, and what weapons strikes and bodily engagements were carried out.

⁵ Bridgford, ‘Mightier than the Pen?’; Horn, ‘Weapons, Fighters and Combat’; Kristiansen, ‘The Tale of the Sword’; Matthews, ‘Chelsea and Ballintober Swords’; Mödinger, ‘Ritual Object or Powerful Weapon?’; Molloy, ‘Use-Wear Analysis’; O’Flaherty et al., ‘Ceremonial or Deadly Serious?’; Quilliec, ‘Use, Wear and Damage’.

⁶ Molloy, ‘What’s the Bloody Point?’; ‘Martial Arts and Materiality’; ‘Swords and Swordsmanship’.

⁷ See for example Harding, *Warriors and Weapons*; Thorpe, ‘Warfare in the European Bronze Age’.

⁸ Dolfini and Crellin, ‘Metalwork Wear Analysis’.

⁹ Mauss, ‘Techniques of the Body’; but see Molloy, ‘Martial Arts and Materiality’, for an insightful discussion of the phenomenology of “combat archaeology”.

¹⁰ More information about the project can be found here: <<https://sites.google.com/site/bronzeagecombat/>>.

One of its main objectives is to explore the possibility of linking distinctive combat marks with specific uses of the weapons including strikes, blocks (or “parries” in swordplay jargon), stabs and throws. The project unfolded following three main steps. Firstly, rigorous field experiments were designed: in these, replica weapons could be tested against other weapons, replica shields (made of leather, bronze and wood), and static targets. Secondly, the wear marks generated in the tests were examined microscopically, catalogued based on a coherent nomenclature, and recorded both graphically and photographically. Thirdly, archaeological weapons from various museums in the United Kingdom were examined for wear marks, paying special attention to those matching the experimental marks.

One of the major theoretical hurdles to be overcome whilst designing the project was how to carry out meaningful yet formalised experiments with replica weapons. Two contrasting approaches had been tried previously: laboratory tests¹¹ and field tests.¹² The former offer the distinctive advantage of a controlled environment, in which all factors contributing to wear formation can be monitored, recorded and understood. Yet the drawback is that the complexity of human behaviour cannot be reproduced adequately by a rig or robotic device. In contrast, the latter provide us with an opportunity to experiment with objects in seemingly “authentic” conditions,¹³ but control of wear formation processes can be poor. Problematically, “authentic” combat tests need to be grounded in a predetermined body of knowledge regarding use of the weapons, which is normally provided by medieval fight books.¹⁴ Not only are these sources, however, often cryptic, partial and open to innumerable interpretative problems; they also discuss historically contingent combat styles, which cannot be uncritically projected back into the prehistoric past. Nevertheless, historical sources provide valuable information about the use of weapons that, on occasion, were formally similar to Bronze Age weapons.

To limit the distortions caused by either type of test, we decided to undertake two separate weapon experiments. In the first, we broke down continuous combat sequences into discrete actions to be recorded individually. In the second, we strove to recreate a realistic Bronze Age sword fight based on the combat techniques ascribed to Andre Lignitzer, compiled in a mid-fifteenth-century German fight book.¹⁵ This approach combines the benefit of fully recordable, if rather crude, weapon tests with embodied experiments in which the mechanical properties of the weapons can meaningfully be understood in relation to the biomechanical properties of the combatants.¹⁶

As the project is still ongoing, this paper solely discusses results of the first type of sword tests. The results are then interpreted in the light of the wear analysis of eighteen Late Bronze Age swords from the Great North Museum: Hancock and the Yorkshire Museum of Archaeology.

¹¹ E.g. O’Flaherty et al., ‘Ceremonial or Deadly Serious?’; Bridgford, ‘Weapons, Warfare and Society’.

¹² E.g. Molloy, ‘What’s the Bloody Point?’; ‘Swords and Swordsmanship’; ‘Use-Wear Analysis’.

¹³ Kamphaus, ‘Weapons and Armour’, p. 121.

¹⁴ E.g. Clements, *Medieval Swordsmanship*; *Renaissance Swordsmanship*; Forgeng, *Medieval Art of Swordsmanship*; Talhoffer, *Fechtbuch*; Wagner and Hand, *Medieval Sword and Shield*.

¹⁵ Peter von Danzig, 1452 (Roma, Accademia Nazionale dei Lincei, Cod.44.A.8), fols 80r, 80v.

¹⁶ Molloy, ‘Martial Arts and Materiality’, p. 118.

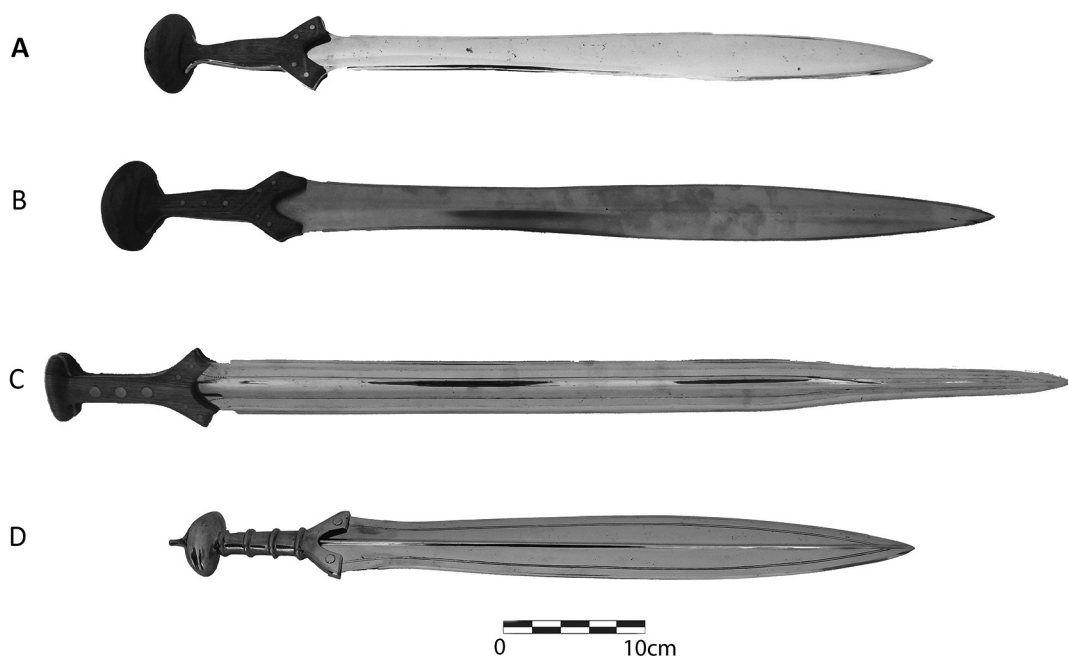


FIG. 1: A: SW1, Type Wilburton; B: SW2, Type Ewart Park; C: SW3, Type Carp's Tongue; D: SW4, Kemenczei's Type S Vollgriffschwert.

The swords

Four replica swords were used in our combat tests, based on extant British and continental templates. They were manufactured by Neil Burridge using traditional casting and working methods (www.bronze-age-craft.com). To avoid discrepancies in the test results,¹⁷ all swords were cast with the same 12% tin-bronze alloy.¹⁸ Their cutting edges were then work-hardened and sharpened. Finally, oak hilt plates and pommels were added to three swords, while the fourth had the hilt and pommel cast in solid bronze (fig. 1).

The first weapon (SW1) is a Wilburton type sword. Swords of this kind mark the first stage of the British Late Bronze Age (Wilburton Phase, c.1150–975 B.C.); they are found all

¹⁷ See for example the work of Gutiérrez Sáez and Llopis, 'La funcionalidad sobre material metálico', which considers the impact of alloy composition and work-hardening on the wear of bronze knives and axes.

¹⁸ This alloy composition sits near the upper end of the spectrum documented for British Late Bronze Age swords (Northover, 'Analysis and Metallurgy'); it was chosen as it improves the fluidity of the cast and reduces the risk of potentially dangerous casting defects developing within the objects.

over Britain with a special concentration in the south-east.¹⁹ The second (SW₂) is a Ewart Park sword. These swords are found in great numbers throughout the British Isles and are dated to the later part of the Late Bronze Age (Ewart Park Period, c.925–800 B.C.).²⁰ The third (SW₃) is a Carp's Tongue sword, a type mostly found along the Atlantic façade, particularly in Brittany and south-east England; they are generally dated to the later part of the Late Bronze Age (Ha B2/B3 and Bronze Final III, c.950–800 B.C.).²¹ The fourth weapon (SW₄) is a European continental sword, a *Vollgriffschwert* belonging to Kemenczei's type S.²² These swords are mostly found in Hungary and are dated to the Ha A1 period (c.1200–1000 B.C.).

Ten spears (with shafts and heads of different lengths) and three shields were also used in our tests, but they are solely discussed here when used as targets for sword attacks.

The combat tests: methodology

Our experiments aimed to recreate prehistoric one-on-one combat and small group tactical fighting. Our research design was predicated on the belief that, during combat, weapons of different kinds would have encountered each other. Therefore, we tested sword against sword, sword against spear (including the shaft) and sword against shield. To allow for chronological consistency, tests were solely carried out with weapons that would have been in use at the same time, i.e. SW₁ vs. SW₄ and SW₂ vs. SW₃. These comprised four strikes and six parries (table 1).

TABLE 1: Weapon strikes and blocks (or “parries”) tested within the Bronze Age Combat project.

Strikes	
Leg strike	The attacker swings the weapon with its tip facing downwards in a low-angled arc to strike the other weapon near the defender's legs, in the region of the knee area. The attack is parried with the defending sword pointing downwards at an angle.
Hip strike	The attacker swings the weapon horizontally in an arc to strike the defender's weapon near the hip. The defending sword is held almost vertically pointing upwards in front of the hip. To counter the height of the blow the defender has to crouch slightly.
Shoulder strike	The attacker swings the weapon in a diagonal arc from above to strike the defender's weapon near the shoulder or neck. The defender holds the weapon diagonally in front of the body, slightly raised towards the shoulder, with the tip pointing upwards towards the shoulder opposite the sword hand, to cover the upper body.

¹⁹ Burgess and Colquhoun, *Swords of Britain*, pp. 40 ff.

²⁰ *Ibid.*, pp. 55ff.

²¹ *Ibid.*, pp. 108–11.

²² Replica after Kemenczei, *Schwerter in Ungarn II*, p. 47, No. 185.

Head strike	An overhead strike, coming straight down onto the defender's weapon in the head area. The defending sword is held horizontally above the defender's head.
Parries	
Static edge parry	The defending weapon is held in place to block the attacker's strike with the cutting edge.
Static flat parry	The defending weapon is held in place to block the attacker's strike with the flat of the blade.
Kinetic edge parry	The defending weapon is moving away from the defender's body, forcefully meeting the incoming strike with the cutting edge.
Kinetic flat parry	The defending weapon is moving away from the defender's body, forcefully meeting the incoming strike with the flat of the blade.
Dynamic edge parry	A kinetic parry carried out with so much force and momentum that it catches the attacking blade on the cutting edge and knocks it off its course. This parry may be best described as a weapon attack met by another weapon attack.
Dynamic flat parry	As per above but the parry is executed with the flat of the blade.

The experimental protocol described above had to be modified for the shield tests: due to health and safety reasons it was not safe to allow a person to use the shield defensively against a full-force weapon attack. Instead, similar strikes were carried out against the shields mounted in front of hay bales. Further strikes were carried out against the shield rim in order to test shield resistance to forceful slashing attacks that were not blocked by the shield surface. We also thrust the sword horizontally into the shield boss and body to test penetration.

All experiments comprised static, kinetic and dynamic parries (see table 1) in order to replicate a range of potential situations that could create the wear marks observed on prehistoric swords (fig. 4). Static experiments might at first seem to be unhelpful as it is unlikely that, in a real combat situation, the defender would hold their weapon statically and allow it to be struck. However, these tests enabled effective examination and interpretation of weapon damage based on objective experimental evidence. They also allowed us to compare our tests to the literature.²³ The dynamic tests we conducted relate most clearly to what we consider to be a true combat situation, in which both combatants are engaging in full-force interpersonal violence and are actively using their weapons for attacking and defending. Separating out static, kinetic and dynamic tests allowed us to examine the linkage between different marks and the conditions in which they were generated, and to test the conclusions arrived at by other researchers in a non-laboratory environment.

Working strike by strike and parry by parry, each action was individually filmed and photographed, and all marks thus generated were recorded photographically, with the location and shape of each mark being also noted and labelled. This allowed us to build direct linkages between specific combat moves and specific marks. It soon became apparent, however, that the protocol we had originally devised was extremely ambitious, for the

²³ Bridgford, 'Weapons, Warfare and Society'; Molloy, 'What's the Bloody Point?'; 'Use-Wear Analysis'; O'Flaherty et al., 'Ceremonial or Deadly Serious?.'



FIG. 2: Bronze Age Combat experiment, sword tests. Leg strike met by a static edge parry.

planned strikes and parries were more damaging to the weapons than we had foreseen. We thus cut down on their number in order to carry out a sufficient number of tests on all weapons. Moreover, one of the swords was bent beyond repair during a parry experiment and this further decreased the number of tests we could carry out (see below).

WEAR ANALYSIS OF THE REPLICASWORDS

To qualify the results from the experiments, a coherent list of terms had first to be defined. As no universally accepted terminology exists for metalwork wear marks,²⁴ we defined the terms to be used in our project based on our own experience and the literature.²⁵ On occasion, existing definitions did not seem adequate or detailed enough and had to be altered (table 2).

²⁴ Dolfini and Crellin, 'Metalwork Wear Analysis', pp. 82–83.

²⁵ Bridgford, 'Weapons, Warfare and Society'; Horn, 'Weapons, Fighters and Combat'; Molloy, 'Use-Wear Analysis'; O'Flaherty et al., 'Ceremonial or Deadly Serious?.'

TABLE 2: List of wear mark terms used in the Bronze Age Combat project including their interpretation and literature.

Mark Description	Mark Interpretation	Literature
Manufacturing Marks		
Patterns of striations on the body of the sword	Grinding and polishing marks to clean the surface of the weapon following casting.	Horn, 'Weapons, Fighters and Combat', pp. 33–34.
Regular patterns of long striations running along the length of the object.		
Patterns of striations on the blade edge	Sharpening marks.	Horn, 'Weapons, Fighters and Combat', pp. 33–34.
Short striations along the cutting edge, usually parallel to the cutting edge or mildly inclined.		
Patterns of rounded depressions	Hammering marks – the exact shape depends on the hammerhead and force used, but they are most frequently elongated. Hammering can be used to harden the cutting edge, to create bevel-lines or to repair localised damage.	Horn, 'Weapons, Fighters and Combat', p. 34.
Depressed marks usually located on the blade edge.		
Wear Marks		
Notch	These marks are commonly created when one cutting edge clashes against another. Notches are commonly found in combination with material displacement, failure and fissures. The spatial relation between the flanks and the cusp of the notch may yield information about the directionality of the impact, e.g. upwards (towards the hilt) or downwards (towards the tip).	Similar to those identified by Horn, 'Weapons, Fighters and Combat', p. 22. Equivalent to the V-shaped notches identified by O'Flaherty et al., 'Ceremonial or Deadly Serious?', p. 43; and Molloy, 'Use-Wear Analysis', p. 76.
V-shaped mark cutting into the cutting edge of a weapon. It consists of two flanks and a cusp.		
Grazed Notch	Grazed notches occur when the cutting edge of a weapon clashes with that of another at a shallow angle. The cutting edges graze and scrape along one another, causing material displacement. Directionality of impact can almost always be surmised.	These have been separated from the notches identified by authors such as Horn, 'Weapons, Fighters and Combat'; O'Flaherty et al., 'Ceremonial or Deadly Serious?'; and Molloy, 'Use-Wear Analysis', as their profiles are different, and so is the nature of the impact that created them.
A grazed notch shares the V-shaped profile of a notch but one flank is at a much shallower angle than the other.		

Mark Description	Mark Interpretation	Literature
Indentation	Indentations are often caused by objects of a more rounded shape such as spear sockets or axe shafts. They also occur on the cutting edges of attacking swords. Material displacement often takes place around the indentation, creating burrs or swollen rims. The impact directionality is generally not determinable.	Horn, 'Weapons, Fighters and Combat', p. 22. Equivalent to Bridgford, 'Weapons, Warfare and Society', p. 105, "bowed" and O'Flaherty et al., 'Ceremonial or Deadly Serious?', pp. 48–49.
Rounded impact profile along the cutting edge of a weapon. These marks are generally shallower and wider than they are deep		
Micronotching	These small marks are usually the result of a rebound from high-impact contacts. During our experiments these marks formed during dynamic parries and occasionally during kinetic parries.	This mark is similar to the "double-impact" marks identified by O'Flaherty et al., 'Ceremonial or Deadly Serious?', p. 49.
Small notches and indentations (c.2mm) usually associated with a larger notch or indentation.		
Material Displacement	Any impact will cause the metal to react in a certain way. Material displacements include flattening, compression of metal, bulging out and the formation of ripples.	Similar to Horn, 'Weapons, Fighters and Combat', p. 22, but this category excludes his category of material failure.
A plastic deformation around an impact zone where you can see that material has been displaced from its original location.		
Fracture	If mechanical stress exceeds the material's ductility the metal breaks apart.	Horn, 'Weapons, Fighters and Combat', p. 32.
Material failure so severe that parts become detached.		
Fissure	If the mechanical stress is not heavy enough or acts on an area not sufficiently large, the metal may end up fissured rather than fractured.	Horn, 'Weapons, Fighters and Combat', p. 32.
Material failure less severe than a fracture as nothing becomes detached.		
Flat-side marks	These marks form as the result of an impact to the flat of the blade from another weapon. As the impact force is distributed over a larger surface the resulting material displacement is less prominent than that which we see on the blade edge. Elongated striations most likely result from cutting edge impact, whereas round or oval marks can be caused by tip impact. Patterns of striations often occur as the result of a scraping motion along the flat of the blade.	Horn, 'Weapons, Fighters and Combat', p. 22.
Striations, round or oval marks on the flat of the blade.		

Mark Description	Mark Interpretation	Literature
Tip Pressure	Tip pressure is likely the result of a range of offensive manoeuvres such as thrusts and stabs, but can be the result of any impact to the tip. In extreme cases impacts to the point can lead to a fracture.	Perhaps a confusing term as it could also describe the effects of pressing a tip onto a surface, but adopted here as already established in Horn, 'Weapons, Fighters and Combat', p. 22; Molloy, 'For Gods or Men?'; and Uckelmann, <i>Schilde</i> , p. 194.
Flattened point of the sword sometimes accompanied by visibly displaced material on the tip of the weapon.		
Bending	Bending of the sword can be deliberate or accidental, and even the result of soil pressure during deposition. During our experiments swords were always bent during dynamic parries and occasionally during kinetic parries.	Similar to Horn, 'Weapons, Fighters and Combat', p. 32.
A large-scale plastic deformation affecting part or the whole length of the sword along the lateral axis.		
Twisting	Mechanical stress acting in certain directions may cause twisting deformation. During our experiments, some degree of twisting occurred as a result of dynamic parries.	Horn, 'Weapons, Fighters and Combat', p. 32.
Plastic deformation along the longitudinal axis of the sword.		
Post-Depositional Marks		
Striations cutting through the patina	These marks frequently occur as the result of the object's treatment after recovery. They are often caused by clumsy attempts to "clean" the object or to determine the material the object was made of.	Horn, 'Weapons, Fighters and Combat', pp. 33–34.
Striations cutting through the patina of alteration/ corrosion products covering the object.		

A detailed appraisal of every combat test and resulting marks goes beyond the scope of this paper. The next section solely discusses three sword strikes, which were blocked with a static, kinetic and dynamic sword parry respectively.

Action 1: right shoulder strike, edge parry, static – SW2 attack, SW3 defend

Figure 3 shows the marks that resulted from a full-force shoulder strike executed on the right-hand side of the attacker, defended on the left with a static edge parry. A deep notch, angled in the direction of the hilt, was created on the attacking sword. The boundaries of



FIG. 3: Top: SW2 attack, right, shoulder strike, full force, 301mm from tip; bottom: SW3 defend, edge parry, static.

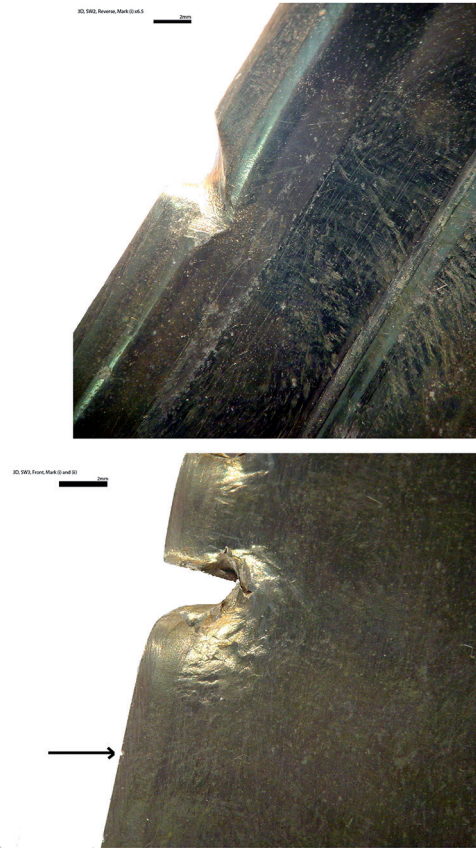


FIG. 4: Top: SW2 attack, right, shoulder strike, full force, 241mm from tip; bottom: SW3 defend, edge parry, kinetic.

the notch show material displacement in the form of compression and rippling; several small fissures were also created in the cusp of the notch. Moreover, a shallow indentation angled in the direction of the hilt was created in the cutting edge of the defending sword. The attacking sword cut into the edge of SW3, scraping and deforming the metal, thus creating a compressed swelling on the upper end of the mark.

This combat action has yielded fairly unexpected results. Instead of creating a notch directed towards the tip in the attacking sword, as one would perhaps expect considering the downward-arching motion of the attacking sword, the notch is facing the opposite direction. On the defending sword, the mark is in the shape of a grazed indentation instead of a notch. It is possible that a twisting motion in the attacker's wrist caused SW2 to scoop this indentation into the defending sword.

Action 2: right shoulder strike, edge parry, kinetic – SW2 attack, SW3 defend

Figure 4 shows the marks that resulted from a full-force shoulder strike executed on the right-hand side of the attacker, defended on the left with a kinetic edge parry. The force of the kinetic parry caused a rebound, creating a further clash with lower force resulting in a second set of marks.

As one might expect, a deep notch angled in the direction of the tip of SW2 was created in the attacking sword. The impact caused a fair amount of metal compression and rippling, while small fissures also formed around the cusp of the notch. The rebound resulted in the creation of a second, if smaller, notch approximately 5mm further towards the hilt (see the arrow in fig. 4, bottom). This notch is angled towards the hilt of the sword and shows material displacement around its boundaries.

The notch in the defending blade was also angled in the direction of the tip and penetrated the bevel line. The directionality shown by the mark was caused by two factors: the slight upward motion of the kinetic parry as well as the slight angle of the defending sword towards the defender's head at which the sword was held. Small-scale material displacement in the form of compression took place towards the tip end of the notch. A small amount of metal was chipped off near the cusp of the notch. Two smaller marks were found in close proximity to the notch as the result of the rebounding process.

Action 3: left leg strike, flat parry, dynamic – SW1 attack, SW4 defend

Figure 5 shows the marks that resulted from a full-force leg strike executed on the right-hand side of the attacker, defended on the left with a dynamic flat parry. The extreme force behind the two high-velocity motions caused the defending sword to bend, thus making it unsuitable for further combat use.

The attacking sword (SW1) struck the defending sword (SW4) on the central ridge and proceeded to scrape down along the flat of the blade. The long, deep striation of the initial impact on the flat of SW4 is accompanied by a pattern of closely clustered, broader striations. The great force behind both the attack and the parry concentrated on a relatively narrow part of the defending blade, thus causing considerable plastic deformation on the latter (fig. 5, bottom). As for damage caused by this forceful blade-on-blade contact to the attacking sword, the central ridge of SW4 created a small indentation and material displacement on the cutting edge of SW1. A slight flattening of the cutting edge can also be seen next to the mark, further up towards the hilt.

The blade bending may have been manually corrected.²⁶ This would however have added a further strain to the molecular lattice structure of the material, making the sword brittle and possibly liable to fracturing. The strain could have been relieved by annealing,²⁷ but it

²⁶ This is the strategy adopted in other combat experiments, e.g. Anderson, 'Bronze Age Spears'.

²⁷ Notis, 'Metals', pp. 59–60.

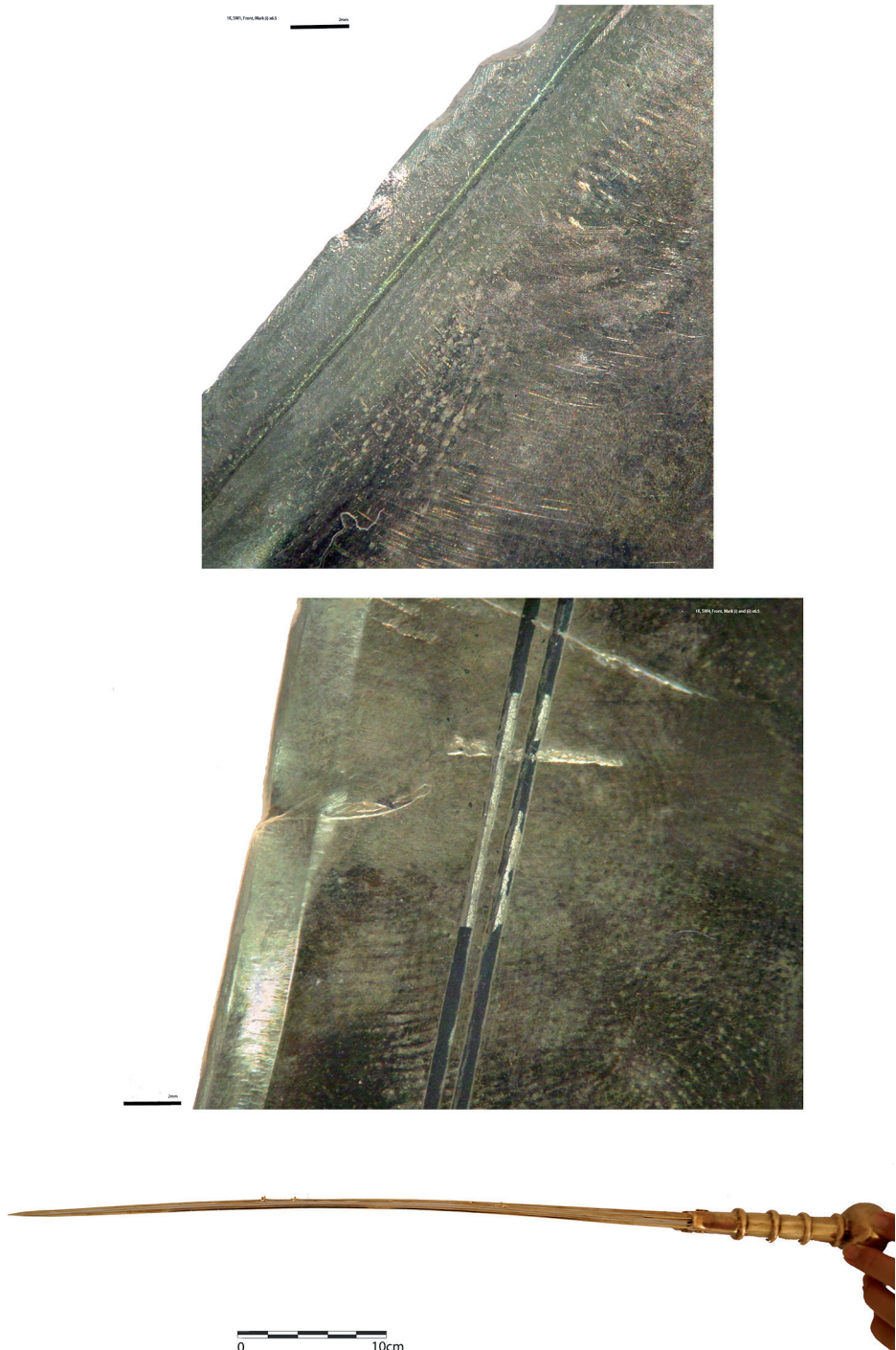


FIG. 5: Top: SW1 attack, right, leg strike, full force 236–240mm from tip; middle: SW4 defend, flat parry, dynamic 325mm from tip; bottom: bending of SW4.

was decided not to rework any of the swords as this would have added a further variable to the tests.

It must also be noted that severe wrist pain was experienced by the combatants every time a parry was carried out with the flat of the blade despite their using wrist-supporting gauntlets. This was a further factor inducing us to alter the original experimental protocol and abandon further parries with the flat of the blade.

Discussion

When conducting sword versus sword combat, our tests indicate that marks were created on both the attacking and the defending weapon. In all cases the wear marks were deep and pronounced. The most frequent marks created by our combat tests were notches. These were always accompanied by some form of material displacement, and occasionally by material failures and fissures. Moreover, a natural turning of the sword at the time of impact often caused curled flanks. Less frequently, the action resulted in small indentations. Microchipping near the point of initial impact often occurred when the attacking sword rebounded on the defending blade as the force of the attack could not be fully absorbed by the first impact.

We were surprised by the results gained through our dynamic parries, in which both swords were used actively as might occur in a true combat situation. In all cases, at least one of the swords was heavily damaged. Grazed notches and fissures were also frequently observed. Most surprising, however, were the results of parrying with the flat of the blade. This generated characteristic patterns of striations on the body of the defending sword. Furthermore, the dynamic flat parry resulted in heavy plastic deformation along the sword's lateral axis, to a degree that made the weapon unusable without repair.

Our tests also revealed discernible patterns in the location and clustering of impact marks. In particular, most marks were created in the lower half of the blade (i.e. towards the tip), while no marks at all were generated on the upper third of the blade (i.e. towards the hilt). This pattern seems logical as the fighters would aim to use the length of the sword to their advantage while keeping the opponent at the greatest possible distance.

In many cases, there was a clear difference between the marks created on the attacking and the defending sword, although this is not true for all tests. For example, in sword-on-sword combat often the attacking sword was marked by an indentation. However, similar marks were also generated by sword-on-spear and sword-on-bronze-shield contacts, which are not discussed here.

WEAR ANALYSIS OF PREHISTORIC SWORDS

Wear analysis was carried out on eighteen Late Bronze Age swords from Britain: eleven from the Yorkshire Museum of Archaeology (prefix YORYM) and seven from the Great North Museum: Hancock (prefix NEWMA), Newcastle upon Tyne. This aimed to compare the marks generated by our combat tests with those found on archaeological swords, thereby

gaining a foothold into prehistoric swordsmanship and fighting practices. Where possible, the swords' accession numbers have been matched with their entries in *The Swords of Britain*.²⁸

The analytical protocol was adapted from Dolfini, integrated by Dolfini and Crellin.²⁹ The analysis was carried out on the original objects at museum premises, as taking dental casts would have been impractical and expensive due to the objects' size. Following an initial assessment using plain eyesight and a magnifier, each weapon was microscopically examined using a Huvitz HSZ-645RT stereomicroscope. Micrographs were taken with a mounted GXCAM-9 or a Dino-Lite digital microscope. Details and position of each mark were then recorded in a purpose-built MS-Access database. In it, the obverse always refers to the side of the object showing the accession number, while 'right' and 'left' are defined in relation to the obverse and the distance of the mark is measured from the tip of the point. Results of the analysis are summarised in table 3.

TABLE 3: Wear analysis of eighteen Bronze Age swords.

ID	Type	Sword	Description
1	Ballintober	YORYM1948.1303, No. 27 ³⁰	Only five shallow wear marks were identified on this sword. The notches and grazed notch indicate clashing, yet limited contacts with other bladed weapons. The lack of heavy contact, however, does not necessarily indicate a lack of use in combat, as the sword could have been used with a fighting technique that evaded contact with another blade as much as possible.
2	Ballintober – Chelsea Variant	YORYM1948.1308, No. 53 ³¹	Notches and grazes on this sword indicate that it was used in combat. Striations are present but too shallow to be the result of combat, suggesting that great care was taken not to damage the weapon. The majority of wear marks are located on the right cutting edge, suggesting a preferred way of holding the sword, and possibly indicating that the sword had a single owner with a specific handedness.
3	Clewer	YORYM1948.1300, No. 93 ³²	There is a large number of wear marks, including thirty-seven notches and thirty-five indentations on this sword. The notches are generally deep and wide angled, the indentations clear and round. These marks match those created during the sword-on-spear combat during the experiment. Some grazed notches indicate that repeated forceful clashes with another blade took place.

²⁸ Burgess and Colquhoun, *Swords of Britain*.

²⁹ Dolfini, 'Chalcolithic Metalwork in Italy'; Dolfini and Crellin, 'Metalwork Wear Analysis'.

³⁰ Burgess and Colquhoun, *Swords of Britain*, p. 20.

³¹ Ibid., p. 23.

³² Ibid., p. 32.

ID	Type	Sword	Description
4	Ewart Park	YORYM1948.1161, No. 460 ³³	This sword displays eight indentations and extensive damage to the point tip. It appears as if the sword was used in combat against blunt weapons, or weapons with large blunt areas, which have caused the indentations. Furthermore, the weapon was used for thrusting to penetrate materials that caused the tip damage (e.g. hide or wooden shields).
5	Ewart Park	YORYM1948.1168, No. 520 ³⁴	The large number of wear marks indicates that this sword was extensively used in combat. There are clear signs of high-velocity clashing contacts with other blades and for combat against spears. The sword fractured three times and was repaired by melting an amount of copper-alloy onto the fractures thus welding them back together.
6	Ewart Park	YORYM1948.1245, No. 503 ³⁵	Due to heavy corrosion, only a few marks could be identified. Consisting of several grazed notches, notches and indentations these marks do suggest that the sword was used in combat though certain marks indicate that the sword might have been used in situations similar to our "dynamic parries".
7	Ewart Park	NEWMA1814.22.1, No. 542 ³⁶	This sword displays a large number of various wear marks, including forty-six notches and sixteen indentations. In particular, the number, depth and width of certain notches as well as the presence of grazed notches indicate that the sword was used in combat against a variety of weapons including swords and spears.
8	Ewart Park	NEWMA1814.22.2, No. 531 ³⁷	Partial acid-etching has made wear analysis difficult on this sword, but the marks identified on the preserved parts of the cutting edges indicate that the sword was likely used in combat against a spear or similar weapon. Tip pressure indicates that the sword was also used for thrusting.
9	Ewart Park	NEWMA1923.9, No. 549 ³⁸	The two notches identified on this blade appear to be the result of the primary impact followed by a rebound of one single action against another bladed weapon. Despite this evidence for a clashing contact the marks are too few to suggest extensive use in combat.

³³ Ibid., p. 89.

³⁴ Ibid., p. 95.

³⁵ Ibid., p. 94.

³⁶ Ibid., p. 97.

³⁷ Ibid., p. 96.

³⁸ Ibid., p. 97.

ID	Type	Sword	Description
10	Ewart Park	NEWMA1932.20, No. 486 ³⁹	A total of forty-five different notches and fourteen indentations indicate heavy usage in combat against a variety of weapons. Wide-angled notches and rounded indentations further indicate use against spears.
11	Ewart Park	NEWMA1932.21	Thirty indentations as well as a total of nine notches and grazed notches indicate that this sword was mainly used against a weapon with a blunt shaft and some sort of cutting edge, most likely a spear.
12	Ewart Park	NEWMA1933.22, No. 544 ⁴⁰	Despite being broken in half, there are virtually no wear marks on this sword, which could indicate use in combat. As this sword was found as part of a hoard, it seems likely that it was ritually broken prior to deposition.
13	Gündlingen	YORYM1948.1301, No. 722 ⁴¹	The majority of the marks, including twenty notches and eighteen indentations, are located on the right cutting edge, indicating a particular handedness of a single owner. The marks further indicate repeated use in combat against other weapons such as spears.
14	Gündlingen	YORYM1948.1165, No. 733 ⁴²	Only a fragment of this sword has survived but it appears as if it was extensively used in combat. The notches are all fairly deep and clear-cut. Grazed notches and striation patterns indicate that the blade met another weapon frequently with force and at high speed.
15	Gündlingen	YORYM1886.33, No. 716 ⁴³	Despite a small number of wear marks this sword does not appear to have been extensively used in combat. The blade shows numerous casting defects and is fractured. The fracture could be the result of poor casting, although ritual breakage cannot be excluded <i>a priori</i> given that it was deposited in a river.
16	Gündlingen	NEWMA1929.67, No. 729 ⁴⁴	Eighteen deep notches and five indentations are the signs of heavy use in combat. Furthermore, there is a sharp bend and a semi-circular deep scratch pattern after around one third of the blade. Both bend and scratch pattern are strikingly similar to the marks created during our tests as a result of parrying with the flat of the blade.

³⁹ Ibid., p. 92.

⁴⁰ Ibid., p. 97.

⁴¹ Ibid., p. 119.

⁴² Ibid., p. 119.

⁴³ Ibid., p. 118.

⁴⁴ Ibid., p. 119.

ID	Type	Sword	Description
17	Wilburton	YORYM1966.I, No. 224 ⁴⁵	This sword displays eleven indentations and six notches, and is also significantly bent about a third of the way along the length of the blade. A striation pattern can be found on the inside of the bend, which is strikingly similar to the marks created in our tests as a result of parrying an attack with the flat of the blade. The marks are also very similar to those observed on NEWMA1886.33.
18	unknown	YORYM1948.II62	This blade displays very few wear marks, indicating that it was not extensively used in combat. The presence of five notches, three grazed notches and one indentation indicates that clashes with other bladed weapons almost certainly took place though. The tip has fractured and is surrounded by fissures. The unusual lozenge shape of the blade could indicate the testing of a new sword design which was quickly abandoned after a short trial period in which the marks were created.

DISCUSSION

The wear analysis of the eighteen Late Bronze Age swords shows that, in many cases, these weapons saw live combat action, whose nature can frequently be interpreted by reference to our tests. Our experiments indicate that most actions will result in different wear marks, although unspecific wear marks can also be generated (i.e. similar marks caused by different weapons or strikes). In particular, sword versus sword edge contact mostly leaves notches and grazed notches. These often have a clear directionality, which is informative about the ways the weapons were moving. Another element emerging from our tests is that full-force, high-speed impacts tend to leave a grazed notch on one weapon and an extremely deep (and often plastically deformed) notch on the other. This frequently allows us to differentiate between attacking and defending weapons, although the full range of our tests suggests that, unfortunately, this is not always the case. Although they are not discussed in this work, tests replicating sword versus spear combat show that contact between the two weapons are likely to create fewer notches due to the shorter cutting edges of the spear-heads. Instead, contact is often made with the socket or the shaft, which leave long rounded indentations on the sword's cutting edge.

All the marks created on the replica swords during the tests were deep and pronounced. The relatively small number of combat tests to which any of our swords was subjected had devastating results on the integrity of the blades, and in one case led to the weapon failing altogether. This is not borne out of the archaeological evidence. Although swords 3, 7, 10 and 14 show vast amounts of wear, the majority of the swords discussed above

⁴⁵ Ibid., p. 51.



FIG. 6: Top: plastic deformation in SW4; middle: plastic deformation in sword 16; bottom: plastic deformation in sword 17. Striking similarities between the experimental and archaeological swords suggest that the bending was caused by a defensive move executed with the flat of the blade in a highly dynamic environment.

display well-preserved cutting edges, with relatively few combat marks and little discernible repair work. This lends itself to two considerations: firstly, Bronze Age sword fighting was extremely focused on the preservation of the weapon;⁴⁶ secondly, Bronze Age sword bearers would normally have carried a shield, for their swords were not suitable for defensive blocks. Preoccupations about preserving the cutting edge were not unique to prehistoric swordsmanship. Yet we suggest that weapon preservation would have had greater importance in Bronze Age fighting practices than it had in medieval and post-medieval swordsmanship on account of the different mechanical property of bronze and steel. As for the need to fight with a sword and a shield (and possibly a body armour of some description), not only is this abundantly underscored by early historical and literary sources;⁴⁷ it is also confirmed by recent experiments with Bronze Age shields.⁴⁸

The similarity of certain wear marks seen on both replicas and originals, however, suggests that swords did on occasion clash with one another. Such clashes were probably accidental, or else they might be interpreted as last-resort defences against overwhelming attacks. This is most notably the case with parries executed with the flat of the blade. In particular, our tests indicate that flat parries effected in a highly dynamic environment may result in sword failure (figs 6–7). This clearly differentiates Bronze Age from historic swordsmanship, in which various kinds of flat parries were taught.⁴⁹ Once again, the difference seems to be rooted in the different mechanical properties of bronze and steel, which would have led to the emergence of two distinct traditions of European martial arts during the Bronze Age and in the medieval period.

⁴⁶ Molloy, 'What's the Bloody Point?', pp. 107–8.

⁴⁷ See Howard, *Bronze Age Military Equipment*, for discussion and literature.

⁴⁸ Molloy, 'For Gods or Men?.'

⁴⁹ Schmidt, *Schwertkampf*.

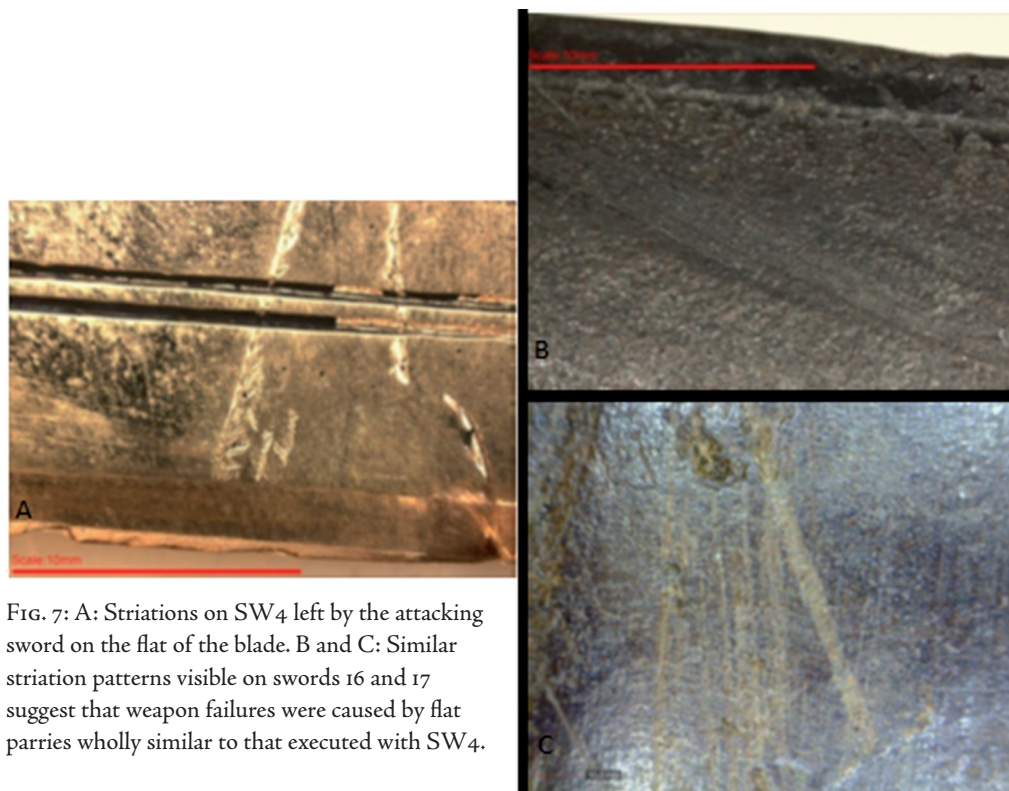


FIG. 7: A: Striations on SW4 left by the attacking sword on the flat of the blade. B and C: Similar striation patterns visible on swords 16 and 17 suggest that weapon failures were caused by flat parries wholly similar to that executed with SW4.

On a broader scale, our experiments have shown that extinct martial arts can be reconstructed through a research approach combining painstaking observations of ancient combat marks, rigorous experimentation with replicas, and embodied weapon tests based on historic sources. Although less rigorous than the controlled tests discussed in this paper, the latter experiments are in our view necessary to assess the way in which both weapon and combatant function as a single biomechanical unit. Moreover, they shed light on how different weapons may be used against each other in combat encounters, and how fighting styles may be adapted to situations ranging from one-to-one duelling to tactical group fighting and unstructured melee combat. These experiments will be discussed in a future publication.

CONCLUSION

The experiments and analysis discussed in this paper lend themselves to three principal conclusions. Firstly, it has been shown that a number of marks visible on Bronze Age swords can be interpreted by reference to the marks created experimentally through controlled tests with replica weapons. Importantly, many of these marks can be linked to specific combat actions, thus enabling researchers to reconstruct an extinct tradition of prehistoric

swordsmanship. Secondly, similarities and differences between Bronze Age and historic sword fighting have been highlighted. The similarities encompass the need to use a shield and possibly body armour whilst fighting with a sword, and also uses of the sword with a fairly elaborate fighting style that would have included thrusting/stabbing motions as well as slashes and cuts.⁵⁰ Bronze Age sword fighting shows a greater need to protect the weapon's blade than in medieval times due to the differing mechanical properties of bronze and steel. In particular, fighters would have avoided parrying with the flat of the blade – a move routinely practised in medieval and post-medieval swordplay – due to the potentially devastating effect this could have had on the defending weapon. Thirdly, the range of marks observed on archaeological swords suggests that, in live engagements, these would have met not just other swords, but also shields and spears. This seemingly indicates that swords would have been used in a range of situations including intergroup violence, possibly on a rather large scale.⁵¹ Their use in more formalised practices such as duelling and ritualised fighting, however, cannot be excluded.

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⁵⁰ Molloy, ‘What's the Bloody Point?’.

⁵¹ Curry, ‘Slaughter at the Bridge’; Jantzen et al., ‘Bronze Age Battlefield’.

Egenolff's Fight Book

Form and Thought, Then and Now

Matthias Johannes Bauer

“AS THOU RETRIEVEST THE Book from its cradle, you must recite these words: *Clatu Verata Nectu*”.

In the cult film *Army of Darkness* (1992, directed by Sam Raimi) the protagonist Ash is tasked with finding an unholy Book of Death, the *Necronomicon*, in the fourteenth century to be returned home to the twentieth century with its help. He finds the *Necronomicon* in an old cemetery but mispronounces the magic formula and thus awakens the undead *Army of Darkness*.

What does this have to do with medieval fight books? When suddenly “beads” (“Knöpfe”) roll instead of “heads” (“Köpfe”) it can be established that malapropism and misunderstandings are, on a linguistic level, the most common feature of German fencing terminology and literature of the fourteenth to the sixteenth century.¹ I would like to illustrate this with the help of one of the objects of the *Deutsches Klingensmuseum*: “The Book of Malapropisms”...

In the sixteenth century, four editions of an anonymous fight book were released by the printing office of the Frankfurt printer and publisher Christian Egenolff (1502–55). Solely in the last edition, of which a copy was shown in the exhibition “The Sword – Form and Thought” at the *Klingensmuseum*, the colophon states that it was published in 1558 by *Christian Egenolffs Erben* (Christian Egenolff’s Heirs). The other editions are undated. The first edition, however, can be dated to approximately 1530/31.²

The diagram in figure 1 exemplifies the chronology of the four editions.³

Of the four known editions of the Egenolff Fight Book, twenty-three copies could be identified (table 1), although one has been lost to the ravages of war. Eight copies of the edition entitled *Der Allten Fechter gründtliche Kunst...* (1st edition, [1530/31]; VD 16-ZV9515) still exist today, including one originally produced in colour. Out of the remaining editions, four preserved copies of *Der Altenn Fechter anfengliche Kunst...* (2nd edition, undated; VD 16-L876) and three copies of *Fechtbuoch. Dje Ritterliche Mannliche Kunst vnd Handarbeyt*

¹ Bauer, *Der Allten Fechter gründtliche Kunst*; ‘Fechten lehren’; ‘Fachsprache oder Geheimsprache’.

² In my PhD-thesis I could date the first edition by codicological analysis of the Paderborn copy to approximately 1530/31: Bauer, *Der Allten Fechter gründtliche Kunst*, pp. 17–23 and pp. 54–56.

³ *Ibid.*, p. 56.

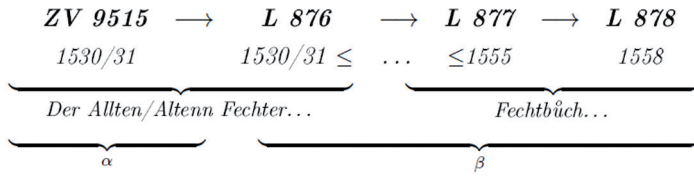


FIG. 1: Chronology and grouping of the four editions of the Egenolff Fight Book.

Fechtens vnd Kempfens... (3rd edition, undated; VD16-L877) could be researched, as well as eight preserved copies of *Fechtbuoch. Dje Ritterliche, Mannliche Kunst und Handarbeyt Fechtens, und Kempfens...* (4th edition, dated 1558; VD16-L878).⁴

TABLE 1: Number of identified copies of the four known editions of the Egenolff Fight Book.

Edition (VD16-Number)	Number of copies
<i>Der Allten Fechter gründtliche Kunst...</i> (1st edn.; ZV9515)	8
<i>Der Altenn Fechter anfengliche Kunst...</i> (2nd edn.; L876)	4
<i>Fechtbuoch. Dje Ritterliche Mannliche Kunst vnd Handarbeyt Fechtens vnd Kempfens...</i> (3rd edn.; L877)	3
<i>Fechtbuoch. Dje Ritterliche, Mannliche Kunst und Handarbeyt Fechtens, und Kempfens...</i> (4th edn.; L878)	8
Total:	23

The copy exhibited in Solingen belongs to this last group of the final edition (dated 1558; VD16-L878) and is central to my paper.⁵ It was purchased in 1959 from the antiquarian bookshop Leisten in Cologne.⁶ The copy is missing four leaves, namely folios 33 to 36, which had been erroneously counted as folio 29. On folio 16v the face of the left figure in the woodcut has been scratched off. The liberal cropping of the copy has partially corrupted most of the woodcuts.⁷

All four editions of the Egenolff Fight Book begin with two brief introductory passages. The book firstly starts with a foreword of approximately two and a half pages, addressed to the reader. There, the anonymous author refers to antique gladiators in a typical humanistic manner while at the same time lamenting a decay of morals and fencing skills.⁸ The foreword is then followed by “Zwoelff leren den angehenden Fechteren” (“twelve teachings to the novice fencer”). The twelve “lernen” (teachings) can be first found in this specific compilation with

⁴ Ibid, pp. 25–35.

⁵ Solingen, Deutsches Klingmuseum, WAF CE 40.

⁶ Deutsches Klingmuseum Solingen, unpublished records. – Thanks to Dr. Barbara Grotkamp-Schepers.

⁷ All codicological informations about the Solingen copy derive from my autopsy of the copy itself, cf. Bauer, *Der Allten Fechter gründtliche Kunst*, pp. 29–32.

⁸ Bauer, *Der Allten Fechter gründtliche Kunst*, pp. 13f and pp. 57–60.

	α		β		FIG. 2: Arrangement of the four editions (overview).
	ZV 9515	L 876	L 877	L 878	
<i>Vorred</i>	✓	✓	✓	✓	
<i>Register</i>	✓	×	×	×	
<i>Zwölff leren</i>	✓	✓	✓	✓	
<i>Hauptteil</i>	✓	✓	✓	✓	
<i>Register</i>	×	✓	✓	✓	

Andre(as) Paurneindt's Fight Book from 1516⁹ and might have been adopted from there or from the Egenolff Fight Book into Hans Czynner's Fight Book from 1538.¹⁰

In the edition ZV 9515 (= group α) the register can be found between "*Vorred*" (introduction) and "*lernen*" (teachings). In group β (= L876 to L878) the register can be found on the last, unnumbered folio (fig. 2). It lists all technical terms alphabetically and uses the folio numbers to refer to the respective descriptions.

The main part of the book consists of several sections, for example "*Fechten im langen Schwerdt*" (unarmoured fighting with the longsword), "*Messerfechten*" (fighting with a specific single-handed, single-edged melee weapon), "*Fechten im Tolchen oder Kaempfftegen*" (dagger fighting) and "*Stangenfechten*" (fighting with the quarterstaff):

1. *Erst Theil diß Buochs. Wie man fortheyl im langen Schwerdt/ welchs ein grundt vnnd Vrsprung allen Fechtens/ zuo beden henden brauchen sol.*
 - *Zwo Regeln/ darauß die Acht Ringen gehn.*
 - *Zuo dem kurtzen Schwerdt.*
2. *Von Messerfechten.*
 - *Fechten im Bucklier oder Rodeln.*
 - *Fechten im Tolchen od[er] Kaempfftegen/ Siben merckliche Regeln.*
 - *Volgen vil kunstlicher stuck Kaempffens/ Ringens vnd Werffens.*
3. *Drittheil dises Buochs. Von Fechten in der Stangen*

The Egenolff Fight Book quotes a Hans Lebkommer from Nuremberg as one of its composers for the section on *Messer* fighting; the name is very likely to be a malapropism of the name Hans Lecküchner, a famous *Messer* fencer from the fifteenth century.¹¹ The Lecküchner treatise admittedly received a wide reception, but neither text nor illustrations in the Egenolff fight book are directly related to Lecküchner.¹²

But there are many more malapropisms and the like to be found in the text...

⁹ Bauer, 'Paurneindt Fechtbuch'.

¹⁰ Czynner, *Fecht- und Ringlehre 1538* (ed. by Bergner and Giessauf), p. 296.

¹¹ Leng, *Katalog*, pp. 73–77; Bodemer, *Das Fechtbuch*, pp. 171–81.

¹² Leng, *Katalog*, p. 74: "Die Drucke des Egenolff'schen Fechtbuchs [...] führen zwar einen zu Hans Lebkhommer [sic] verballhornten Lecküchner als Verfasser an, haben jedoch weder in Text noch in der Illustration unmittelbaren Bezug zu Hans Lecküchner"; Bodemer, *Das Fechtbuch*, p. 204, footnote 509: "Dies [i.e. the part of *Messerfechten* in the Egenolff Fightbook] hat mit dem Fechtbuch Hans Lecküchners von 1482 nichts gemein!"; Forgeng, *Medieval Art of Swordsmanship*, p. xx: "The version in the Egenolff Fechtbuch substantially shortens and rearranges Lecküchner's



FIG. 3: Left: The term “Niderstauchen” in ZV 9515, fol. 42v, in *Der Alten Fechter gründtliche Kunst* (München, Historisches Fechtarchiv/Antiquariat Köbelin); right: The term “Niderlauffen” in L 878, fol. 40r, in *Fechtbuoch*.

CHANGE IN USE OF TECHNICAL TERMS, MALAPROPISMS AND COPY MISTAKES

Early New High German fight books are generally characterised on a linguistic level by a complex confluence of group specific language aspects.¹³ The lexis used in the Egenolff Fight Book especially demonstrates changes in the use of technical terms, malapropisms and copy mistakes.

In Egenolff's Fight Book the term “Niderstauchen” (ZV 9515, fol. 42v) changes within its four editions to “Niderlauffen” (L 878, fol. 40r), while text and pictures and thus the signified “thing” remain unchanged (fig. 3). Interestingly, the fight book itself broaches the issue of this and other changes in technical vocabulary, although the anonymous writer offers no explanation (ZV 9515, fol. 6v):

Vier Glaeger alleyn Halt/ vnd fleuch die gemeyn.
Ochs/ Pfluog/ Alber Von tach/ sei dir nit vnnehr.

text, although here for once the text is correctly attributed, even if the name is rendered as ‘Hans Lebkommer’.

¹³ Bauer, ‘Teaching How to Fight’; ‘Fechten lehren’; ‘Fachsprache oder Geheimsprache’.

¶ Nach¹⁴ vnserer neuen art haben wir andere namen/ wiewol ein bedeutung
ist/ Als Hochort/ Hangend ort/ Eisern pfort/ Pfluog/ Die sind vilfaltig.¹⁵

Only the term “Pfluog” remains unchanged within this short sample. The remaining old terms, which understandably had been passed in a much more stable manner in the rhymed verse form, are being replaced with new terms in the prose version. The rhymed version of the fighting treatises date back to a time when they had to be kept secret and were thus encoded in verse form.¹⁶

As canonical texts, following Jan Assmann,¹⁷ these verses carry the characteristics of cultural as well as holy texts. Cultural texts, on the one hand, have a binding character for the whole of a society, in the sense that they are normative, formative, and provide meaning and identity; holy texts on the other hand, are connected to a belief in something holy that one does not have to understand but rather must be able to reproduce or recite as accurately as possible (as with “CLATU VERATA NECTU”). Exclusivity, secrecy and rituals are attributes of holy texts, not cultural texts. In short, while the holy text is subjected to the strictest limitations of access and demands for purity, the cultural text aims to be normatively and formatively binding for the entire society.

The anonymous writer is obviously well aware that even before his time a massive change in the lexis of this specialised language must have occurred. He is not aware, however, of why and how these changes occurred, or at least does not answer these questions.

Furthermore, there are other textual sources proving that even in the sixteenth century it was impossible for some fighters (and authors of fight books) to always derive the etymology of their own specialised lexis. Even though they themselves belonged to the group of speakers, they did in some cases not know the meaning of their own technical terms.

A good example is the fight book by Joachim Meyer, a fencing master from Strasbourg, which was published in 1570 by Thiebolt Berger in Strasbourg. There, Meyer speculates about the origin of the term “Olber” being derived from “Alber” (simpleton):

*Der Olber wirt meines erachtens von dem wort Alber / welches ist
so vil als einfeltig genennet / sintemal auß disem Leger
kein volkomlicher fertiger streich mag erlanget werden. . .*¹⁸

In fact, within the four editions of the Egenolff Fight Book, “spontaneous” neologisms do occur. An example of one such malapropism that leads to the formation of a new

¹⁴ ¶ = caput.

¹⁵ “[...] According to our custom we now use other terms, yet meaning the same [...]” (translation by the author).

¹⁶ Bauer, ‘Teaching How to Fight’; ‘Fechten lehren’; ‘Fachsprache oder Geheimsprache’; Müller, ‘Hans Lecküchners Messerfechtlehre’; ‘Bild – Vers – Prosakommentar’; ‘Zwischen mündlicher Anweisung’.

¹⁷ Assmann, ‘Text und Kommentar’, and based on him: Bauer, ‘Teaching How to Fight’; ‘Fechten lehren’; ‘Fachsprache oder Geheimsprache’.

¹⁸ “In my view, the term *Olber* derives from the word *Alber*, which means something like simple-minded, oafish ...” (translation by the author).

technical term – and therefore provides proof of the immanent change in the lexis of fencing terminology – could be the term *“flech”* (the surface of the blade): *“Merck was die flech ist”* (notice the flat surface area of the blade) in the first edition (ZV 9515, fol. 4r) turns into an unrecognisable malapropism, probably due to copy mistakes in typesetting, in the editions L877 und L878: *“Merck was die Fech is”*.

Since the printers and typesetters of Egenolff's Fight Book often tend to use a capital at the beginning of a technical term (semantic capitalisation), and therefore were apparently at least a bit sensitised to this type of technical term, maybe what can be observed here is a lack of understanding of the text. Fencing terminology that could not, or no longer be understood was no cause for concern since it was typical of the jargon of these specialists. To put it differently, terms and their spellings, which were unknown to the printer, were not questioned, since they were assumed to be part of the technical jargon.

In addition to malapropisms that in some instances unrecognisably distorted the lexis, many “classic” copy mistakes can be found in the Egenolff Fight Book. These copy mistakes are caused by copying the text and typesetting it from the previous edition to the next. In some cases, these errors give the text a new and different meaning as these examples illustrate:¹⁹

- The art of fencing as an exercise of the body (*“ein leiblich Exercitation”*, fol. 2r) changed into sweet exercise (*“lieblich Exercitation”*) in edition L878.
- Well-versed fighting is important in editions ZV9515 and L876 in order to avoid shame (*“damit man nit endtlich mit schanden auß dem Vor ins Nachsehen komme”*, fol. 2v), whereas the following two editions L877 and L878 place more importance on avoiding harm (*“mit schaden”*).
- In group α the front leg should be bent (*“bogen”*, fol. 4r) whereas group β instead intends the leg to be hidden (*“verborgen”*).
- In some cases changes at the syntactic level of the sentence occurred such as *“prueff ob er hert oder weych lige”* (“check if he is strong or weak on the sword”, ZV 9515, fol. 9v) in to *“pruef ob er weich oder hert lige”* (“check if he is weak or strong on the sword”) in L878.
- Similarly unproblematic for understanding the text are changes like *“So einer dir deinen arm also vff seiner achseln brechen wil”* in ZV9515 to *“So einer dir also deinen arm vff seiner achseln brechen wil”* in L876 and L877 up to *“So einer also dir deinen arm vff seiner achseln brechen wil”* in L878 (“As someone tries to break your arm upon his shoulder” in three different syntactical sequences).
- Another unproblematic example in the same fashion is *“Ob dich also einer hindergen wil”* in α (fol. 45v) as opposed to *“Ob dich einer also vndergehn wil”* in β – but only at a syntactic level. The semantic change from “cheating” (*“hindergen”*) to “sinking” – or more freely: “dipping someone under water” (*“vndergehn”*) – could lead to very different results depending on the interpretation of the fencing instructions.
- Such accidental changes in the semantics are much more problematic. There is a grave difference if the recipient following the instructions headbutts the opponent

¹⁹ Bauer, *Der Allten Fechter gründtliche Kunst*, pp. 77–79.

(“Mit dem kopff greiff/ wiltu rangen”; “Attack with the head to start wrestling”) as in ZV9515 (fol. 12r), or following the text in L877 and L878 attacks with the pommel (“Mit dem knopff greif/ wiltu rangen”; “Attack with the pommel to start wrestling”) – the semantic switch of head (“kopff”) versus pommel (“knopff”) is not uncommon within the tradition of the Egenolff Fight Book. Similarities can be observed in the case of the semantic switch of an elongated leap (“spring gstrack”) in α (fol. 21v) to a powerful leap (“spring starck”) in β , or from “Damit du ihn magst fueren” (“So you can lead him”) in ZV9515 and L876 to “Damit du ihn magst fuehlen” (“So you can feel him”) in L877 and L878. These kind of changes in the semantics happen relatively frequently in the case of personal pronouns, but mostly without a change in meaning.

- Especially blatant are confusions of left and right. “Trit vff seinen rechten fuoß mit deinem lincken” (“Step on his right foot with your left”), the reader is asked, for example, in ZV9515 (fol. 37r), whereas in L878 “Trit vff seinen lincken fuoß mit deinem rechten” (“Step on his left foot with your right”) is written in the same place. This happens frequently within the four editions: “schreit mit deinem rechten hinder seinen rechten schenckel” in α (fol. 44v), as opposed to “schreit mit deinem rechten hinder seinen lincken schenckel” in β , or “mit deiner rechten handt” (α , fol. 45v), as opposed to “mit deiner lincken handt”, etc.

Apparently these linguistic “damages” to the text did not, however, pose a threat to its popularity. The reason for the book’s success can be explained from its (literary) historic context.

THE EGENOLFF FIGHT BOOK IN ITS (LITERARY) HISTORIC CONTEXT

Christian Egenolff the older was born in 1502 in Hadamar (Hesse).²⁰ It remains unclear whether or not Egenolff learned the art of printing in Mainz, where he attended university from 1516 onwards. The colophon of a book published in Strasbourg in 1528, however, already states his name as the printer. From other sources it can be concluded that he went to Strasbourg in 1527. At the end of 1530 he moved from Strasbourg to Frankfurt where he stayed until his death in 1555 and produced over 420 different printed items. Egenolff, who also owned a second printing shop in Marburg from 1538 to 1542, seems to have had a good mind for business and popular titles. He left a rich inheritance to his wife, Margarethe, who took over the print shop after Egenolff’s death and continued to run the business with the help of her sons-in-law under the name of “Egenolff’s Heirs”. They continued to publish the successful fight book for a fourth and final edition.

But how can we explain the great success of the fight book that was everything but a shelf warmer?

The free city of Frankfurt on the Main combined two characteristics that brought about the great success of the Egenolff Fight Book. On the one hand, the city was at the centre

²⁰ Bauer, *Der Allten Fechter gründtliche Kunst*, pp. 81–88; Jäcker, *Christian Egenolff*, pp. 25–46.

of the German or even the European book trade at the time.²¹ On the other, it was an important centre of the art of fencing and swordsmanship in the German-speaking region, perhaps second only to Augsburg. It can be verified that from the end of the fifteenth century onwards the dominant organisation of German fencers, the Brotherhood of St. Mark, met here once a year for their autumn convention to elect their head and recognise new masters in front of the whole gathering.²² The newly settled printer Christian Egenolff apparently quickly realised that fight books were a sure sale in this city.

How the text corpus of the Egenolff Fight Book was compiled can no longer be constructed. It is clear, however, that the fight book published by Christian Egenolff is a compilation, even more so than other Early New High German fight books.²³ It also remains unclear if Christian Egenolff compiled the fight book himself or if he hired a fencer (perhaps from Strasbourg or Frankfurt?) to compile it for him.

The awkward use of fencing terms within the fight book could be an indication that no practitioner of the art of fencing was included in the genesis of the text. For the reasons shown here, the text becomes incomprehensible in several places.

This incomprehensibility caused by a change in the use of technical terms, malapropisms and copy mistakes, must be present in the mind of everyone using fight books like the one by Christian Egenolff today, as historic sources but also especially as a guide to practice the art of fencing.²⁴

Therefore, the words of the movie *Army of Darkness* could be adapted to:

"As thou retrievest any fight book from its cradle, you must recall these words: CHANGE IN USE OF TECHNICAL TERMS, MALAPROPISMS, COPY MISTAKES."

By using the wrong terms, not knowing that they might be malapropisms, you could awaken an army of darkness...

²¹ Weidhaas, *Zur Geschichte*; Toeller, *Die Buchmesse*.

²² Haage and Wegner, *Deutsche Fachliteratur*, pp. 258–62.

²³ Ibid., p. 259.

²⁴ Two demonstrative examples can be given here of an online translation of the Egenolff Fight Book that is badly flawed (and wrongly attributed to Hans Lecküchner) – presumably for the reasons shown in my paper, and moreover due to a lack of understanding of Early New High German: "*Mein gegen man, ich thu bedrang*" – "Mine against anyone's, I have prevailed" (Hans Lecküchner, *Lecküchner's Fechtbuch*) instead of "Over my opponent I do prevail". Note the wrong tense and particularly the detachment in the spelling of "*gegen man*", which means the compound "*gegenman*", correctly translated as "opponent/combatant". Another example: "*Ihn triff, eh er sein Läger schlecht*." – "We met, and his stance was incorrect" (Hans Lecküchner, *Lecküchner's Fechtbuch*) instead of "Hit him before he strikes his [own] manoeuvre". Note the wrong translation of the imperative "*Ihn triff*", and how the conjunction "*eh*" was erroneously translated as "and" instead of "before" (temporal conjunction). This results from mixing the word classes up as well as from a wrong translation of the term "*schlecht*" that only in contemporary High German is indeed the adverb "incorrect". However, being in fact a verb, the term "*schlecht*" correctly translates as the 3rd person singular of "to strike"/"to flourish" in Early New High German. From a linguistic viewpoint, these present-day translations ironically show quite the same characteristics as the flawed text understanding of contemporary fencers shown in my paper.

A Sword for a System

The Pattern 1796 Light Cavalry Sword

Henry Yallop

THROUGH A STUDY OF swords and written evidence this article suggests that the British Pattern 1796 Light Cavalry sword was designed to complement a specific combat system. Both sword and system were developed by the same man, seemingly through a process of the sword's "form" following his "thoughts" on cavalry swordsmanship. The sword's development and form, and how this related to its use and effect are considered; followed by its variants, successors and legacy.

The Pattern 1796 Light Cavalry sword is one of the most iconic military swords ever produced. In widespread service for over twenty-five years of almost continual war, vast numbers of the sword were produced and issued. Extensively exported to, and even copied by, Britain's allies this sword was amongst the most common pattern of combat sword in use throughout the Revolutionary and Napoleonic Wars.¹ Excellent information is already available on this weapon,² which this paper will, as far as possible, try to avoid repeating. Instead it will attempt to look at the sword in a slightly different light, through the relationship of "thought and form", to understand how its design came about and how this related to its intended method of use.

THE SOURCES

The British Pattern 1796 Light Cavalry sword lends itself to this kind of analysis as documentation exists that reveals the "thoughts" on swords and swordsmanship of the man that devised the sword; and numerous original examples survive of what "form" these swords took in practice. The man credited with designing the sword was the serving British cavalry

¹ In addition to being used by British regular, volunteer and East India Company cavalry the sword was also used by Hanoverian, Prussian, Brunswick, Dutch-Belgian, Swedish, Portuguese and Spanish cavalry. Tens of thousands of these swords were exported by Britain to her coalition allies along with other military equipment, by way of supporting their actions on the continent against the French.

² For general information on the sword see Robson, *Swords*, and Dellar, *British Cavalry Sword*.

officer John Gaspard Le Marchant.³ The evidence which gives us insight to the “thought” of the designer are:

1. The *Memoirs of the late Major-General Le Marchant*, compiled by his son in 1841 and containing information from Le Marchant’s earlier, pre-1796 career.⁴
2. Le Marchant’s 1796 *Rules and Regulations for the Sword Exercise of the Cavalry*.⁵
3. An 1809 letter from Le Marchant titled *Remarks on the construction of swords adapted to the use of Cavalry*.⁶

In addition to these written sources are the thousands of swords that were produced from 1796 to 1821,⁷ which provide an abundance of evidence of the “form” these swords took. There also exist several first-hand accounts from those that used, and faced, the sword in combat; which have been substantiated by recent test cutting experiments at the Royal Armouries. Therefore, a relatively full picture of the “form and thought” behind the sword, and how this translated into the use and effect of this weapon can be established.

THOUGHTS ON CAVALRY COMBAT

Before swords are considered it is important to understand Le Marchant’s views on the use of contemporary cavalry, presumably formed from his experiences in the field, as these must have informed his views on swords and swordsmanship. The whole premise that underpinned Le Marchant’s thinking on cavalry is similar to that of Frederick the Great: that speed is the key to successful cavalry actions.⁸ Le Marchant stated that it was the combined weight and speed of the charge that alone determined its success, and in this “first instance” swords were almost an irrelevance. The opportunity of cavalry to inflict casualties came against an enemy broken or disrupted by the shock of the charge, and in the looser melees that followed. Hence cavalry swords must be optimised for use in these circumstances.

Le Marchant argued that the general form of cavalry swords should, therefore, be similar to those of the nations that were the most skilled in these “desultory attacks” that followed the rapid charge: the Indians, Turks, Hungarians and Persians, who all favoured a curved, “scimitar” type sword. These light, curved swords he thought were not only best for causing damage to an enemy after the initial shock of the charge had broken down into individual combats or pursuit; but that a light manoeuvrable sword could be quickly parried with and

³ Le Marchant, *Memoirs*, p. 51.

⁴ The author has attempted contact with the Le Marchant family to ascertain if the papers on which *Memoirs* are based are still in existence, but to date has received no reply.

⁵ Le Marchant, *Exercise*.

⁶ Le Marchant, ‘Remarks’.

⁷ Although a new pattern of light cavalry sword was approved in 1821 its replacement of the 1796 Light Cavalry sword took over ten years in the British regular cavalry and it remained in service with various Yeomanry and Indian cavalry regiments until the at least the 1850s.

⁸ Ellis, *Cavalry*, pp. 92–93.

inflict fast, disabling cuts to an opponent's arm, thus negating the extra reach of an enemy armed with a musket and bayonet, or a longer and heavier thrusting sword.⁹

A NEW SYSTEM OF SWORDSMANSHIP

The form of a sword, however, is almost useless if not used properly, and Le Marchant first sought to remedy the lack of any universal standardised system of swordsmanship in the British cavalry before turning his attention to the weapons themselves. Le Marchant's first taste of action was in Flanders (1793–95) against the Revolutionary French, and it was during this campaign that his interest in swords and swordsmanship was fully piqued. Le Marchant saw the British cavalry experience "many instances of discomfiture" when in single combat with the enemy, and surgeons reported numerous wounds amongst the British cavalry that

⁹ The author is grateful for the assistance of Andrew Orgill, Senior Librarian, Royal Military Academy Sandhurst. Based on the original manuscript and supporting information Mr. Orgill has suggested dating *Remarks* to 1809, rather than the 1789 dating that was attributed to the document when it was published in *JSahr*. *Remarks* is a letter from Le Marchant refuting the suggestion that the cavalry should revert to long, straight swords. The 1809 dating suggests Le Marchant's mentioning of Eastern swords is a case of justifying the general form of his, already adopted, Pattern 1796 Light Cavalry sword, rather than necessarily implying, as had hitherto been assumed, that these Eastern swords were known to Le Marchant in 1789 and had been a direct influence on his design of the 1796 Light Cavalry sword. It now appears the 1796 swords had been in service for over ten years before *Remarks* was written: The only known evidence of Le Marchant mentioning Eastern swords. This new dating of *Remarks* is also more logical in the sense that it suggests that Le Marchant's views on cavalry and swords were at least somewhat formed from practical experience in the field; rather than the 1789 dating that implied Le Marchant held strong views on swords for the cavalry before ever seeing active service. The new dating of *Remarks* means there is no clear evidence for Eastern swords influencing Le Marchant and the design of the 1796 Light Cavalry sword. Given that Le Marchant's interest in swords and swordsmanship is only known of from the Flanders campaign, it would seem more likely that if influence was derived from anywhere for his sword it could have been from the equipment of the allies he studied and admired in Flanders. Of the standard issue swords in use in Flanders the Austrian Model 1768 Hussar sword would seem the most likely candidate as a potential influence on Le Marchant's design. Such statements can only be conjectural, although the re-dating of *Remarks* and account of Le Marchant's interaction with Austrian cavalrymen in *Memoirs* would seem to elevate the likelihood of Austrian influence above the previously assumed Eastern one, for which there remains no evidence. If Le Marchant was, as seems most likely, responsible for adoption of the British Pattern 1796 Heavy Cavalry sword copied from the Austrian Model 1769/75 *Pallasch*, it does not seem inconceivable that other Austrian swords may have had some influence on his design of the 1796 Light Cavalry sword. However, too much emphasis should not be placed upon this possibility, or indeed the level of influence such a sword might have had on Le Marchant's 1796 Light Cavalry sword. As although of a general similar type to the Austrian Model 1768 Hussar sword the 1796 Light Cavalry sword is no mere clone and has many different features.

could only have been self-inflicted through poor sword technique.¹⁰ His subsequent research into correcting this deficiency involved canvassing allied Austrian and Prussian cavalry and observing their technique. When combined with his own experience and experimentation this led to his devising of a comprehensive system involving six cuts, eight parries and three thrusts.¹¹ All the cuts against cavalry were to be carried out without bending the elbow, so as not to expose the forearm to a disabling blow; with movements carried out with the wrist, fingers and shoulder.¹²

This system, *Rules and Regulations for the Sword Exercise of the Cavalry*, was not a mere theoretical treatise but, after being endorsed by the Duke of York, rolled out to the whole of the British cavalry (heavy and light, regular and volunteer) without alteration for the remainder of the wars.¹³

THE NEW SYSTEM AND THE OLD SWORD

The sword illustrated for most of this manual is a relatively standard¹⁴ 1788 Light Cavalry sword (fig. 1), the then standard issue sword for all British light cavalry. This was not a particularly original or necessarily British weapon, as the 1788 Light Cavalry sword was of very similar form to the sword in use with Prussian Hussar regiments from the middle of the eighteenth century.¹⁵ This should not be surprising, as not only had many European nations copied Prussian sword designs since the success of Frederick the Great's cavalry, but Solingen makers were still, despite steep British import tariffs, producing many of the British military's swords.¹⁶

Whilst Le Marchant's criticisms of British swords in Flanders seem to be primarily directed at the 1788 Heavy Cavalry sword, a weapon totally unsuitable for the type of swordsmanship he was developing, even the 1788 Light Cavalry sword was not without its faults.¹⁷ Thus when considered in light of *Exercise* even this more suitable of the two types of British cavalry swords then in service had a number of flaws.

Firstly, although the hilt of the 1788 Light Cavalry sword is not the large type of the heavy cavalry that Le Marchant condemned as "cumbrous",¹⁸ it still would have made some of the

¹⁰ Le Marchant, *Memoirs*, p. 44.

¹¹ *Ibid.*, pp. 32, 44.

¹² Le Marchant, *Exercise*, p. 2.

¹³ Le Marchant, *Memoirs*, p. 48.

¹⁴ It appears that Pattern 1788 swords were not usually, if ever, centrally issued, but purchased by or on behalf of regimental colonels direct from a range of cutlers. This, and the vagueness of the 1788 official specifications, means there was likely to be much more variation in these Pattern swords than later ones. Discussion with Philip Lankester, 2015.

¹⁵ Seifert, 'Prussian Hussar Sabre'.

¹⁶ Cloke, 'Sword Cutlers'.

¹⁷ Le Marchant, *Memoirs*, pp. 49–50.

¹⁸ *Ibid.*, p. 49.

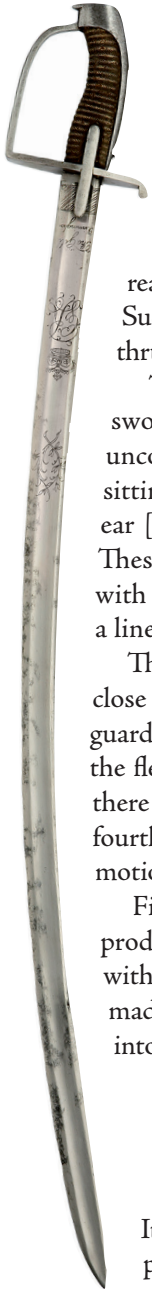


FIG. 1: Pattern 1788 Light Cavalry Officer's sword. (Inventory no.: IX.2123).

motions prescribed in *Exercise* problematic. Some of these swords have, rather than a ferrule, a rivet or screw that sits proud of the backpiece (fig. 2). This would have made holding the sword firmly at the top of the grip difficult, when according to *Exercise* it was at this point that the sword was to be held tightest; the text instructing readers to pay particular attention to holding “the gripe firm with fore-finger and thumb”.¹⁹ Such rivets or screws could have also been interfered with the thumb's position for the thrusting grip: “on the back plate [backpiece], in a line with the back of the blade”.²⁰

The raised pairs of double langets (fig. 2), common on many 1788 Light Cavalry swords, could also have made this firm cutting grip of “fore-finger and thumb” uncomfortable. Furthermore, their presence could have prevented the thumb from sitting comfortably on the side of the grip “between the back plate [backpiece] and the ear [langet]”²¹ as prescribed for the “Left Protect” and “Right Protect” guards (fig. 3). These raised pairs of double langets could have also made the technique of thrusting, with the forefinger “on the gripe between the ear [langet] and back plate [backpiece], in a line with the flat of the blade”²² difficult (fig. 4).

The knuckle-guard on most 1788 Light Cavalry swords is rather constricted and very close to the hand when the sword is gripped. On some examples the gap between grip and guard is as little as 3cm (1¼ ins). This would have made the changes of grip prescribed, or the flexing of the fingers as outlined when cutting, extremely difficult. On such swords, there is simply not room to “allow the hilt to play in the hand, by the second, third and fourth fingers being distended or contracted, as may be necessary to accord with the motion of the blade”.²³

Finally, with regards to the hilt, particularly those 1788 Light Cavalry swords that were produced in Germany tend to have heads of the backpiece that are angular, sometimes with a pointed ‘beak’ like the mid-century Prussian Hussar sword. This would have made the thrusting grip recommended when “the extremity of the sword hilt will fall into the palm of the hand”²⁴ difficult, or even painful to execute (fig. 4).

A NEW SWORD FOR THE NEW SYSTEM

It seems probable that Le Marchant had already identified some of these issues as potential problems when using the 1788 Light Cavalry sword with his new system of

¹⁹ Le Marchant, *Exercise*, p. 19.

²⁰ *Ibid.*, p. 35.

²¹ *Ibid.*, pp. 27–28.

²² *Ibid.*, p. 35.

²³ *Ibid.*, p. 19.

²⁴ *Ibid.*, p. 35.

FIG. 2: Pattern 1788 Light Cavalry swords with screws proud of the backpiece (ringed) and pairs of double langets (arrowed). (Inventory no. front to back: IX.2206, IX.2600 & IX.2123.).

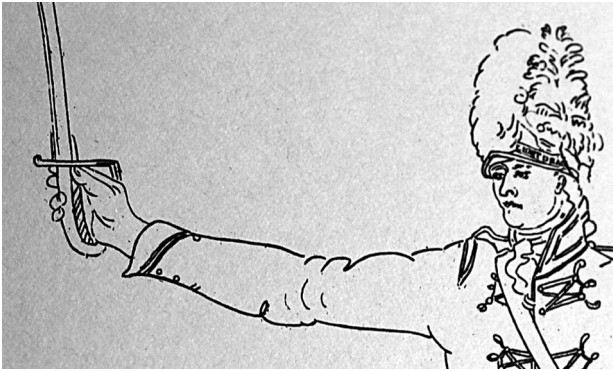
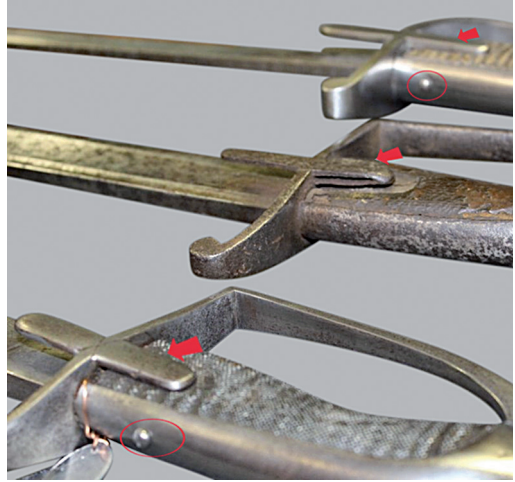


FIG. 3: "Right Protect", from *Exercise*. Note the thumb position, which would be inhibited by raised pairs of double langets. (Inventory no.: RAL.21164).

FIG. 4: "Right Give Point", from *Exercise*. Note position of forefinger and head of backpiece cupped in palm of hand. (Inventory no.: RAL.21164).

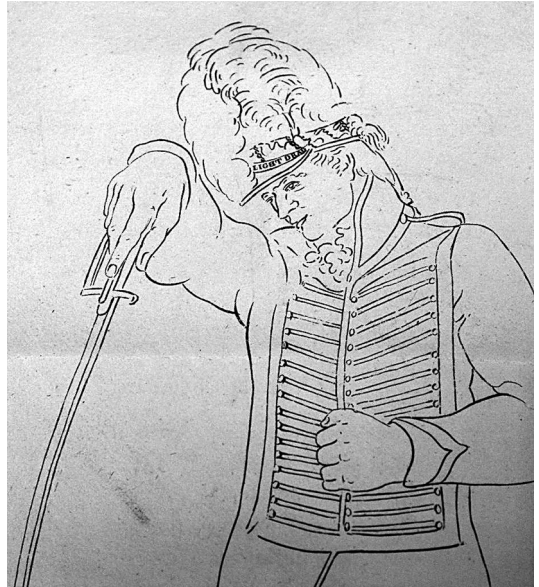




FIG. 5: "A Blade Mounted with a Stirrup Hilt", from *Exercise*. (Inventory no.: RAL.21164).



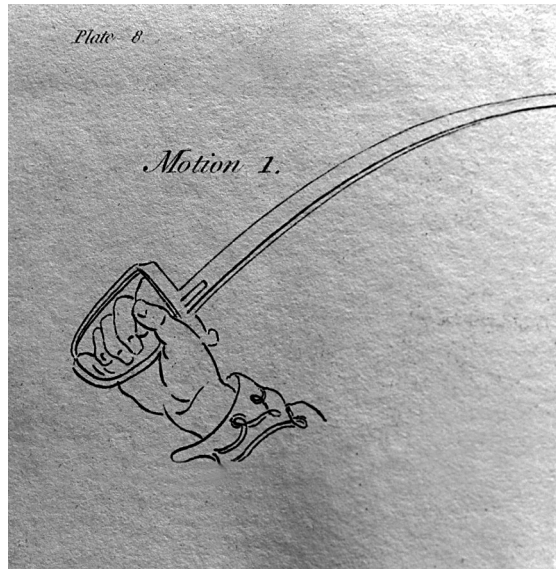
FIG. 6: Hilt of Pattern 1796 Light Cavalry sword. Note large, curved knuckle-guard, single pair of flush langets and curved rear quillon. Also note the rounded head of the backpiece with foot of the stirrup iron entering through the side. (Inventory no.: IX.2587).

swordsmanship. Certainly he appears to have had in mind an improved design that would better suit his purpose by the time *Exercise* was printed. The diagram in the work showing "A Blade Mounted with a Stirrup Hilt" does not illustrate a typical 1788 Light Cavalry hilt, but instead shows one with a roomy and curved knuckle-guard, curved rear quillon, a backpiece with a prominent smooth, rounded head, and a single pair of flush langets (fig. 5). These features addressed all the issues of using the 1788 Light Cavalry sword with *Exercise* and were key elements of the final 1796 Light Cavalry sword (fig. 6).

The knuckle-guard of the 1796 Light Cavalry sword²⁵ (fig. 6), that curves to provide a 6.5cm (2½ ins) gap between grip and guard at the area where the second, third and fourth fingers needed to extend and flex when cutting, also gave room for the grip position changes necessary when guarding and pointing. The smooth ferrule allowed a tight grip with the forefinger and thumb, uninhibited by the backpiece screws or double langets found on many 1788 Light Cavalry swords. The single pair of flush langets not only did not further inhibit this grip, but could have aided, rather than hindered, the grip for thrusting, providing a

²⁵ Whilst still produced by a range of cutlers the degree of variation in 1796 Light Cavalry swords, especially Trooper's swords, is minimal, particularly with regards to the hilts.

FIG. 7: "Cut 2, Motion 1", from *Exercise*. The first sweeping motion that begins all of the six cuts involves bending the wrist back, pressing the rear quillon against the top of the hand. This motion could be more exaggerated and comfortable with a curved rear quillon. (Inventory no.: RAL.21164).



natural rest for the extended forefinger position prescribed when carrying out this action. These flat, wide, shield-shaped langets also provide a natural place for the thumb to rest when performing "Left Protect" and "Right Protect".²⁶ Furthermore, the rounded and smooth head of the backpiece fits comfortably in the palm of the hand when the thrusting grip is taken, in stark contrast to when this is attempted with many 1788 Light Cavalry swords. Moreover, as the curved "foot of the stirrup iron" part of the guard enters through the prominent side of the head of the backpiece, rather than through its top, the full length of the grip, including the smooth head of the backpiece, can easily "play in the hand" as required for all the actions of *Exercise*. Finally, having a rear quillon that curves away from the hand would have enabled the "sweep" action that is the first motion of all the six cuts to be much more comfortable and effective (fig. 7).²⁷

When the hilt of the 1796 Light Cavalry sword is considered alongside *Exercise* and contrasted to 1788 Light Cavalry hilts, it seems that all these changes in form were carefully considered. It appears that the new sword was designed to perfectly suit the actions required of the system of cavalry swordsmanship that Le Marchant had devised, a system that was in the process of being taught to the whole of the British cavalry. Yet Le Marchant was not alone in devising the final new sword for his new system, as he engaged the help of the Birmingham sword cutler Henry Osborn (or Osborne).²⁸

²⁶ Although in *Exercise* it is recommended the thumb sits on the grip itself, with the short grip of the 1796 sword it seems much simpler and more secure to let the thumb naturally fall on the langet when this grip position is taken, for which the langet on the new sword seems perfectly shaped.

²⁷ Although some 1788 Light Cavalry swords did have a curved rear quillon, this was far from being the universal feature it was on the 1796 Light Cavalry sword.

²⁸ Le Marchant, *Memoirs*, p. 51.

It was after his partnership with Osborn had begun that Le Marchant submitted the now lost *Plan for Mounting in a Different Manner the Swords of the Cavalry*.²⁹ It seems probable that this *Plan* was to do with riveted tangs, as it was soon followed by the proclamation for both the heavy and light cavalry swords of the 1796 Patterns, which above all stressed a method for “mounting the shank of the blade with rivets”.³⁰ However, Le Marchant was by no means a junior member of this partnership. He had shown an understanding of some of the principles of sword design long before his collaboration with Osborn, and had headed to Birmingham with clear ideas on the changes he wished to make to the sword in current service; no doubt in light of the requirements of his *Exercise*.³¹

In Flanders Le Marchant had shown interest in sword design by recording his observations about Austrian cavalry swords, which he thought much superior to the British equivalents.³² It is noticeable that both of the new swords borrow the grip construction, including the riveted tang, from the weapon in service with several types of Austrian cavalry at that time: the 1769/75 Pallasch.³³ This was a weapon Le Marchant surely noted in Flanders and of which the subsequent Pattern 1796 Heavy Cavalry sword was an almost direct copy.³⁴ But whereas the Austrian swords had a prominent tang nut and pairs of double langets that would have inhibited some of the grips in *Exercise*, both the new British swords had peened over tangs, making the head of the backpiece smooth in the hand. The pairs of double langets seem to have persisted on early versions of the 1796 Heavy Cavalry sword,³⁵ but were soon replaced with the smooth ferrule, as on the entirely new 1796 Light Cavalry sword. Whether these, or indeed any other, modifications were the result of Osborn the cutler or Le Marchant the swordsman, or a combination of the two working together, may never be known, but the results were swords better suited to their proposed method of use as prescribed in *Exercise*.

In addition to being particularly suited to the techniques of his *Exercise*, Le Marchant may have been aware of another reason in having a light and frontally symmetric hilt (fig. 8). In both *Memoirs* and *Remarks* he implies that asymmetric guards take the distribution of weight from the axis of the blade, making it harder to “carry the edge” and make a deep cut without the weapon turning in the hand, or striking with the flat of the blade.³⁶ This problem of adding weight to the sword and a potential loss of cutting power with heavy or uneven hilts suggests that the small, symmetric guard of the 1796 Light Cavalry sword was a deliberate element of its overall design. Therefore, it should not just be seen in light of the lack of protection it provided compared to its contemporaries. Nor was Le Marchant alone

²⁹ Ibid.

³⁰ London, Public Record Office, WO 3/29, pp. 43–44, cited in Robson, *Swords*, p. 18.

³¹ Le Marchant, *Memoirs*, p. 50.

³² Ibid., p. 32.

³³ Wagner, *Cut & Thrust Weapons*, p. 383.

³⁴ The grip of the 1796 Heavy Cavalry sword is of the same form, but slightly longer and thicker than the Light Cavalry sword. Although it seems probable that Le Marchant was involved in the adoption of the 1796 Heavy Cavalry sword, it is not within the scope of this article to examine the relationship between the Le Marchant and that weapon.

³⁵ See Royal Armouries Inventory no. IX.1282 and IX.968.

³⁶ Le Marchant, *Memoirs*, p. 50; *Remarks*, p. 210.



FIG. 8: Light, frontally symmetric guard in line with axis of the blade. Pattern 1796 Light Cavalry sword. (Inventory no.: IX.2587).

in his theories on the problems of providing hand protection at the cost of a heavy and uneven guard affecting a sword's cutting ability, as this is a factor later stressed by the cutler John Latham of Wilkinson.³⁷

The hilt's possible contribution to the sword's cutting ability should not take away from the role of the blade; as the blade was as much changed from its British predecessors or European contemporaries as the hilt. With every factor of its design optimised for cutting, the blade was perfectly suited to delivering the "six cuts" of *Exercise* in the "desultory attacks" that Le Marchant thought the crux of cavalry swordsmanship.³⁸ The curved blade was termed in contemporary records as a "scimitar" and usually curved $2\frac{1}{4}$ ins (5.7 cm) from the straight line; which on a blade of at most 33 ins (84 cm)³⁹ is considerable. Furthermore, the curve is concentrated over the final half, rather than throughout the full length of the blade as on most contemporary European light cavalry swords. This means that the curvature is more pronounced over the final, cutting portion of the blade than the level of curve measurement alone suggests (fig. 9).

The cutting power of the curved blade has to do with the relationship between the steepness of the curve to the angle of impact of the blade on a target. A curved blade does not meet the target as a straight one, but at an angle, making it cut deeper for the same amount of energy exerted.⁴⁰ The curve also assists with the drawing motion of the cut on withdrawal, making the weapon less likely to become stuck in a target. Le Marchant had

³⁷ Latham, 'Shape of Sword Blades', p. 420.

³⁸ Le Marchant, *Remarks*, p. 210.

³⁹ Although the specifications of 1796 states that the sword should have a blade between $32\frac{1}{2}$ ins and 33 ins, the majority of the sample of fifty complete and unmodified swords from a range of cutlers that were measured by the author had a blade length of 32– $32\frac{1}{2}$ ins.

⁴⁰ Latham, 'Shape of Sword Blades', p. 413.

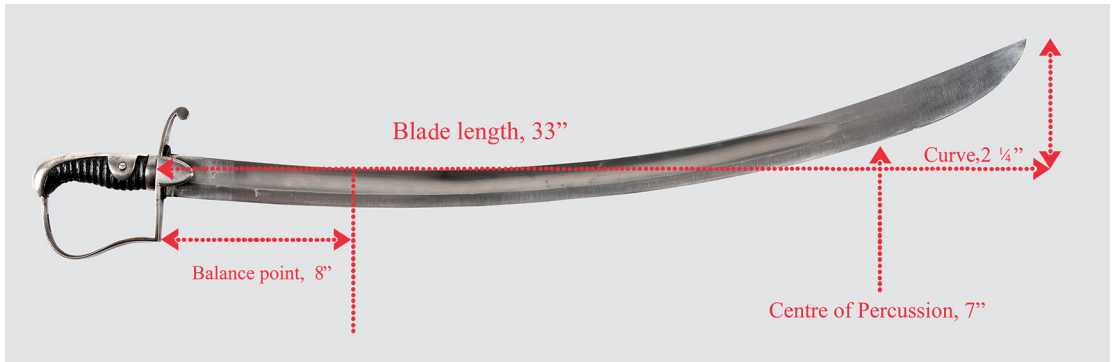


FIG. 9: Pattern 1796 Light Cavalry Trooper's sword. (Inventory no.: IX.245).

demonstrated knowledge of both these factors in *Exercise*. In the section “Application of the Edge” he touches on the superiority of “scymitars” over a straight blade in cutting through a target effectively, being less prone to turn in the hand mid-cut.⁴¹

The width of the blade would have also assisted the sword's cutting potential, being wider than most of its contemporaries, with many examples $1\frac{3}{4}$ ins (4.4 cm) wide. Rather than maintain this width throughout the full length, which would have made the sword excessively heavy, the blades flare towards the tip, sometimes by as much as $\frac{3}{8}$ ins (9 mm) from the narrowest point in its middle section. The flare made the blade broadest around its centre of percussion: the ideal point for the maximum transfer of energy through cutting. This centre of percussion is a surprising distance down the blade, a feature of light and curved blades,⁴² usually falling between 6 ins (15 cm) and 7 ins (18 cm) from the tip: ideal for the actions of *Exercise* which recommend cutting with the final 6 ins (15 cm) of the blade.⁴³ This broad cutting portion of the blade around the centre of percussion lacks a fuller and hence is very flat and thin, with the back of the blade often less than 1 mm thick. The width of the blade, its thinness and absence of fuller⁴⁴ over the cutting area would mean that it met little resistance when it passed through a target, but had sufficient breadth and mass to cut deeply.

What is later described as an “edge that leans forward well”,⁴⁵ as in the blade of the 1796 Light Cavalry sword naturally desires to fall on its edge, would also have aided cutting as no energy would be wasted in generating a forward motion. Le Marchant also demonstrated an understanding of this principle, criticising swords that did not have this feature for

⁴¹ Le Marchant, *Exercise*, p. 75.

⁴² Latham, ‘Shape of Sword Blades’, p. 415.

⁴³ Le Marchant, *Exercise*, pp. 74–75.

⁴⁴ Some swords have the fuller extending to within 5 ins of the tip, but in those cases it is very shallow by that point.

⁴⁵ Latham, ‘Shape of Sword Blades’, p. 413.

making “the momentum of the force become longer” than necessary when cutting.⁴⁶ When these characteristics are combined with a point of balance as far as 8 ins (20 cm) from the hilt, the result was a sword well balanced and proportioned for cutting singly, but also for “the assault”.⁴⁷ This action of rapidly performing the “six cuts” sequentially with successive wrist movements would have been aided by the forward balance of the sword; helping each movement to flow into the next.

Finally on the blade, it is worth noting its lightness. With the weight of most 1796 Light Cavalry Trooper’s swords averaging about 2lb (907 g),⁴⁸ the sword is by far the lightest standard British cavalry sword ever produced, and was also lighter than the standard issue contemporary cavalry swords of the other European powers. This lightness was in part due to its relative shortness and simple hilt, but also due to the blade’s section. The fuller is so deep, even in the thickest portion of the blade, that stamped inspection marks can often be seen showing through on the opposite side.

Creating a light weapon was desirable as Le Marchant thought it vital that wielding it effectively should be “within the compass of everyman”,⁴⁹ especially important for light cavalry who traditionally would recruit smaller men. Besides, *Exercise* is based on rapid wrist cuts, grip changes and quickly recovering guards – something that would be difficult with a heavier weapon.

Perhaps there was also something of Le Marchant’s notion on cavalry that speed is as good as mass in creating energy: “the effect of velocity on contending bodies is now considered to be equal to weight”, translating into the lightness of the weapon he created. That a fast-moving lighter sword can have more effect than a necessarily slower action with a heavier weapon⁵⁰ was probably well known to Le Marchant. Certainly his *Exercise* always stresses cutting towards the tip, the fastest moving part of the blade, and in *Remarks* he points out that those nations that produce expert cavalry all use “a light weapon”.⁵¹

All these features are of course very different to the 1788 Light Cavalry sword, with its heavier, less curved, longer, thicker and narrower blade. These changes to both blade and hilt, borne out in the form of the final Pattern 1796 Light Cavalry sword, are precisely what Le Marchant set out to do in *Memoirs*, where it is recorded that he thought the old swords would:

be much improved by divesting it of all that was superfluous in the handle, by altering the proportions of the blade; by shortening it, and, above all, by proportioning its weight to the lowest standard of Dragoon then admitted into the Service.⁵²

⁴⁶ Le Marchant, *Remarks*, p. 210.

⁴⁷ Le Marchant, *Exercise*, p. 25.

⁴⁸ From a sample of the same fifty swords, weights ranged from 1 lb 12 oz (803 g) to 2 lb 2 oz (975 g). Whilst this gave a mean average weight of 1 lb 14.5 oz (863 g), the most common weight was around 2 lb (907 g).

⁴⁹ Le Marchant, *Remarks*, p. 209.

⁵⁰ Latham, ‘Shape of Sword Blades’, pp. 414–15.

⁵¹ Le Marchant, *Remarks*, p. 210.

⁵² Le Marchant, *Memoirs*, p. 50.

It seems, therefore, that Le Marchant knew precisely the problems of using the sword currently in service in conjunction with his approved *Exercise*, and successfully, with the aid of Henry Osborn, remedied these defects when devising the 1796 Light Cavalry sword.

USE AND EFFECT

Of course, having a weapon optimised for its supposed method of use is all very well, as long as it was used as intended. And there is a good case for this being so with *Exercise* and the 1796 Light Cavalry sword. Not only did Le Marchant outline specific methods of instruction for teaching in *Exercise*, but instructors were sent from all British cavalry regiments to make sure the new drills were properly learnt.⁵³ In addition, numbers of practice swords were issued, suggesting Le Marchant's wish that each regiment should acquire "a certain number of swords to be made use of alone at the drill"⁵⁴ was also implemented. Two such swords are illustrated in (fig. 10). The upper one (IX.2513) has been modified by having the end of the blade rounded off, though the date of this modification cannot be certainly known. The blade of the lower sword (IX.2588), part of a number purchased for the Percy Tenantry Volunteer Cavalry, is made of wood with a guard and ricasso reinforcement in iron. There is also evidence that the Board of Ordnance purchased wooden practice swords.⁵⁵



FIG. 10: Practice Pattern 1796 Light Cavalry swords. (Inventory no.: IX.2513 (top), IX.2588 (bottom)).

The 1796 Light Cavalry sword was carefully designed and widely used, and is also largely reported as being extremely efficient at cutting. Indeed, such is the supposed effectiveness of the weapon that this appears to have been compounded over time to have built up into something of a myth of its fearfulness. The notion that the French made official complaints about the sword is one that has been mentioned by the most respected of authorities,⁵⁶ and has since become an often mentioned "fact" when the weapon is spoken of. And yet, the earliest reference that the author has found dates to a British regimental history of 1912, rather than a French source, and no further reference is given.⁵⁷ Certainly it would seem

⁵³ Ibid., pp. 45–47.

⁵⁴ Le Marchant, *Exercise*, p. 79.

⁵⁵ Wilson, 'Earl Percy's Sword', pp. 26, 28 footnote 10.

⁵⁶ Ffoulkes and Hopkins, *Sword, Lance & Bayonet*, pp. 50–51; Robson, 'Warranted Never to Fail', p. 64.

⁵⁷ Graham, *History of the 16th*, p. 245.

strange for the French to be concerned with a sword when small arms and artillery, shrapnel being a new British invention, were becoming increasingly destructive. Furthermore, in the period there existed no equivalent of the Hague Convention to impose a “ban” on any sort of weapon. It would also have been quite a hypocritical complaint, as some French cavalry used a similarly curved, broad cutting sword.⁵⁸ Accounts exist of this French sword cutting off heads, through skulls and limbs in a stroke, with a similar effectiveness to the 1796 Light Cavalry sword.⁵⁹ More likely this myth of official complaints about the sword came from French anecdotal accounts of the British sword’s effect, rather than from any form of officially lodged objection, accounts such as that of a Captain Parquin, who recorded that: “if the blade found its mark only once, it was a terrible blow, and it was not unusual to see an arm cut clean from the body”.⁶⁰

This is not to say the sword did not win a fearsome reputation. Many first-hand accounts exist from British, French and Allied sources that bear testament to its cutting power. Some are extremely colourful, such as that of Lieutenant Heise who “saw one Frenchman who had had the whole of his head cut off horizontally above the eyes with one blow, and many others with heads split in two”.⁶¹ Others contain a level of detail that is difficult to dismiss. Private Farmer’s account tells of how a French Dragoon’s brass helmeted head was “cloven asunder to the chin” by a cut from his comrade using a 1796 Light Cavalry sword, which might seem unlikely. Yet in comparing the cleanness of the cut through helmet and skull “as if it had gone through a turnip”, the recommended target for sword practice in *Exercise* and something he would be well used to seeing cut with this sword, he adds a level of comparative detail that makes his claim seem all the more plausible.⁶²

Certainly, when compared to the mounted test cutting carried out at the Royal Armouries against a fresh pig carcass with original Pattern 1796 swords, none of the first-hand accounts of the swords’ potential effect seem exaggerated. When testing 1796 Heavy and Light Cavalry pattern swords, the Light Cavalry sword cut significantly more effectively, producing the kind of wounding that contemporary accounts mention. Both swords were tested under the same conditions, the rider moving at the same speed from the same start position, in both cases performing “Cut Two against Infantry” from *Exercise*. Yet the, shorter, lighter more curved Light Cavalry sword not only cut through more muscle and through an extra bone before completely severing the same thick bone that defeated the Heavy Cavalry sword; but also produced a much wider wound (fig. 11).

Nevertheless, not all users spoke of the 1796 Light Cavalry sword’s merits. Two users wrote of their swords failing, with one breaking against the same type of helmet that Farmer recounted as being cut through by a trooper’s sword.⁶³ And yet it is notable that these few

⁵⁸ Model 1777/93 Hussar Sabre, and Sabre of the Chasseurs à Cheval of the Consulate and Imperial Guard.

⁵⁹ Smithies, *Adventurous Pursuits*, p. 35.

⁶⁰ Parquin, *Military Memoirs*, p. 143.

⁶¹ Schaumann, *On the Road*, pp. 96–97.

⁶² Farmer and Gleig, *Adventures*, p. 42.

⁶³ Cocks, *Intelligence Officer*, p. 127; Brotherton, *Hawk at War*, p. 53.



FIG. II: The uppermost wound was caused by a 1796 Light Cavalry sword, whereas the bottom two were caused by a 1796 Heavy Cavalry sword.

examples come from officers. Officers privately purchased their own swords from the cutler of their choosing, which whilst of the same general pattern as their troopers were often more slightly built and not centrally tested. Cutlers could put “warranted” on a privately sold officer’s blade without necessarily subjecting their products to external, objective testing.⁶⁴

By contrast the standard sword of the troopers would have undergone standardised testing by the body responsible for the supply of arms to government troops: the Board of Ordnance. For the 1796 patterns, troopers’ swords were purchased by the government from a range of cutlers who brought the contracted amount of complete weapons to the Board of Ordnance at the Tower of London where they were inspected and tested, before being marked as fit for issue.⁶⁵ In 1797 cutlers were paid the full amount, typically 20 shillings (£1.00), for a sword and scabbard “made conformable to the new regulation table” and a lesser amount, typically 19 shillings (£0.95), for those swords that were the same “but not exact” according to said table. From at least the middle of 1798 the unit price paid for fully conformable swords had typically dropped to 17 shillings and sixpence (£0.875).⁶⁶ That Le Marchant was perhaps even involved in approving the testing process of his 1796 pattern swords is suggested from records that show Le Marchant, together with Major-General Ross – the Master of Ordnance – visiting Henry Osborn in 1797 regarding sword testing machines. It seems most likely that these were the “Machines for Gauging & Proving the new Regulation swords” that Osborn was paid for delivering to the Ordnance in both Birmingham and London. The same bill shows Osborn as having provided “2 Pattern Swords” to both Le Marchant and Ross, quite possibly samples for both men, the designer and ultimate customer, to approve. That Osborn was

⁶⁴ This is borne out in the lack of government inspection marks on both patterns of 1796 cavalry officer’s swords.

⁶⁵ From 1797 the Board of Ordnance were also inspecting swords at a Viewing House in Birmingham, as this where the vast majority of British military cutlers were based. See Robson, *Swords*, p. 278.

⁶⁶ Personal communications with Philip Lankester in 2015 and 2019 drawing on information in the Board of Ordnance records. For example, The National Archives (TNA). WO 52/III, pp. 95, 157, 159; WO 52/122, pp. 324, 325.

providing the Board of Ordnance with the swords against which others of the pattern would be assessed is suggested by a bill that pays him for “12 Pattern Swords sent to the Ordnance View Rooms Birmingham” and is further supported by the fact he was paid expenses to and from London “for the purpose of assisting in fixing upon proper Patterns and receiving directions for making the new gauges” for the swords.⁶⁷ Presumably, Le Marchant was at least one of those Osborn was receiving “directions” from as the latter assisted the former in the creation of these “proper Patterns”.

However, whether a privately purchased officer’s version or a tested and inspected trooper’s sword, such a cut-centric sword design could only perform poorly at thrusting. Although it was an area of lesser importance in *Exercise*, sometimes combat situations would demand use of the point. As effective a cutting sword as it was, even quite rudimentary defences such as the rolled cloak across the shoulder that some French cavalry adopted was reported by contemporary users of the sword as being enough to turn a cut.⁶⁸ Royal Armouries tested this claim with both 1796 pattern cavalry swords, and even the Light Cavalry sword, that had done so much damage to flesh and bone, made almost no impression on the rolled cloak.

Heavy cavalry of the period would have provided more of a challenge to a cut based system, as most wore some form of helmet and Cuirassiers were particularly well protected. Against such opponents, the face would have been the obvious area of weakness, which would be much easier to target with the point than with cuts that could be stopped by a helmet’s peak or chin-scales.⁶⁹ Yet the broad, hatchet-pointed, curved blade was ill-suited to such pointing. The spear-pointing of blades is well known with the 1796 Heavy Cavalry sword, but it appears that this modification was also carried out in some numbers to light cavalry swords, as there are several spear pointed versions in the Royal Armouries reserve collection (fig. 12).⁷⁰



FIG. 12: Pattern 1796 Light Cavalry swords with blades modified into spear points. (Inventory no.: IX.8014 (left) & IX.2586 (right)).

⁶⁷ TNA. WO 52/III, p. 101. I am grateful to Philip Lankester for drawing this entry in the Board of Ordnance Bill Books to my attention.

⁶⁸ Hall, ‘Recollections’, pp. 1540–41.

⁶⁹ At Waterloo, Sergeant Taylor of the 18th Hussars defeated a French Cuirassier after failing to cut through his helmet by thrusting his 1796 Light Cavalry sword into his opponent’s mouth. Dalton, *Waterloo Roll Call*, p. 270.

⁷⁰ It has previously been assumed that Smithies, *Adventurous Pursuits*, p. 64, account of the order “to grind the backs of their swords” before Waterloo into spear points applied only to the heavy cavalry; but the existence of spear pointed light cavalry swords and the fact that Smithies recounts

Even with a modified point the broadness and curve of the blade would mean significant resistance would be met, and less penetration achieved when thrusting. When Royal Armouries tested this against the straight, but still broad bladed, heavy cavalry equivalent, the light cavalry sword achieved less than half the penetration when used in the same manner.⁷¹

VARIANTS

Hence there were much more drastic changes made to the swords' design to improve its thrusting capabilities than merely re-profiling the tip. One of the most popular variants amongst light cavalry officers was the "pipe back", often combined with a "yelman" point.⁷² One trooper's variant, probably privately purchased for Yeomanry, also aimed at making the weapon better for thrusting, and had a double fuller and elongated clipped point.⁷³ Yet any improvement in the weapon's thrusting capabilities necessarily came at the expense of what made the original sword so excellent at cutting. The "pipe back" did stiffen swords for thrusting, but the drastic change in thickness of the blade was a serious impediment to cutting. Both these variants also balance very differently to the standard pattern, are much less curved and are considerably narrower at the cutting portion of the blade (fig. 13). Too many of the properties that made the sword what it was had been lost, turning it into a weapon of compromise. This move towards compromise cut-and-thrust swords was very much the way cavalry sword design went after the Napoleonic period as Le Marchant's sword was replaced. Heavier swords with longer, thicker and narrower blades combined with asymmetric hilts of French style predominated for the next fifty years in Europe.⁷⁴

LEGACY

The Prussian Model 1811 Cavalry Sabre (fig. 14), based on the thousands of 1796 Light Cavalry swords that were exported by Britain to Prussia between 1806 and 1813, was an exception to this trend, remaining in service until the 1870s.⁷⁵ Yet although at first glance it

this order being given to "the cavalry" as a whole suggests some spear pointing of the 1796 Light Cavalry sword could have occurred at this time.

⁷¹ Heavy Cavalry sword with spear point penetrated 5½ ins (14 cm), compared to 2¼ ins (5.5 cm) with the Light Cavalry sword with a hatchet point. Greater penetration can be achieved with a curved blade by an arched thrust, with the motion of the thrusting arm arching to the extent that the blade curves. However, this slower technique is not mentioned in *Exercise*.

⁷² Dellar, *British Cavalry Sword*, pp. 88–94.

⁷³ No examples are known with government inspected blades and at least two examples are marked WSY on one langet, probably indicating the West Somerset Yeomanry. Lankester and Clifford, 'Osborn & Gunby Blade'; Dellar, *British Cavalry Sword*, pp. 95–99.

⁷⁴ Yallop, 'Swords of Empire'.

⁷⁵ Dellar and Binck, 'Blücher Sabre'.



FIG. 13: Possible Yeomanry variant 1796 Light Cavalry sword (left), Standard Pattern 1796 Light Cavalry Trooper's sword (middle), "Pipe back" variant 1796 Light Cavalry Officer's sword (right). (Inventory no.: Left to right: IX.246, IX.2587 & IX.5648).



FIG. 14: Prussian Model 1811 Cavalry Sabre. (Inventory no.: IX.5408.).



FIG. 15: Indian Cavalry Trooper's swords and 1796 Light Cavalry Trooper's sword (bottom). (Inventory no. Top to bottom: IX.5654, IX.5659, IX.1277 & IX.2587.).

appears to be identical to the sword that inspired it, the Prussian sword has many subtle but important differences. The blade of the Model 1811 lacks the gradual but pronounced distal taper of the 1796, meaning it is for the most part thicker. Rather than narrow in the middle and broaden over the cutting area, the blades are the same width throughout their length. The hilt is substantially thicker in all areas, and the grip longer. These differences mean some Model 1811s are over one third heavier than their British counterparts and balance very differently, which would have made wrist based cutting extremely difficult.

Whilst in most of Europe the influence of the 1796 Light Cavalry sword waned, it lived on for longer with the cavalry of British East India Company and the Indian Army. Until 1918 various curved cutting swords, with blades vaguely similar to the 1796 Light Cavalry sword, were in service with generations of Indian Cavalry Troopers.⁷⁶ However, whilst some were either 1796 Light Cavalry swords or those of a similar overall form, other types of curved cavalry swords with greater differences were more common. Hence despite their superficial blade similarities the various asymmetric hilts, pronounced tang buttons, and often slightly thicker, narrower blades mean such swords required very different handling and are more distant relations to the 1796 Light Cavalry sword than they might first appear (fig. 15). Furthermore, these Indian Cavalry swords were intended to be used in a totally different manner; with the elbow bent and wrist rigid when cutting.⁷⁷

⁷⁶ Lankester and Rimer, 'Chest of Arms', pp. 94–100.

⁷⁷ *Cavalry Training*.

CONCLUSION

Rather than live on with vaguely similar weapons, the unique relationship between the “thought and form” of the 1796 Light Cavalry sword, a sword designed specifically to suit an established combat system, did not long outlive its creator in Britain.⁷⁸ Le Marchant’s *Exercise* and sword were replaced in 1819 and 1821 respectively, by a rather different method of swordsmanship⁷⁹ and a sword designed by a cutler and approved by the King without any military consultation.⁸⁰ Never again would one man’s thoughts on military swords and swordsmanship have such a profound effect on the form of a sword that was so widely issued and used for such a length of time;⁸¹ in a period of long-lasting and widespread war which was perhaps the last to see the sword as an important battlefield weapon.

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⁷⁸ Le Marchant was killed leading a decisive cavalry charge at the Battle of Salamanca, 22 July 1812.

⁷⁹ Angelo, *Regulations and Instructions*.

⁸⁰ Robson, *Swords*, p. 24.

⁸¹ Le Marchant’s *Exercise* was translated and adopted by cavalry of the Kingdom of the Two Sicilies in 1823, see Weiss, *Istruzione*, with a 1796 Light Cavalry type sword also being adopted, see Calamandrei, *Storia*, p. 468.

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The sword is the most iconic of all weapons. Throughout history, it has connected various, sometimes conflicting, dimensions of human culture: physical combat and representation of political power, definition of gender roles and refinement of body techniques, evolution of craftsmanship and mythological symbolism.

The articles collected here explore these dimensions, from a variety of disciplines, among them archaeology, medieval history, museum conservation, and linguistics. They cover topics from the production and combat use of Bronze Age swords via medieval fencing culture to the employment of the sword in modern military. They question traditional sword typologies and wide-spread theories about sword making, discuss medieval sword terminology and the use of swords as royal insignia, and describe the scientific methods for approaching original finds. Arising from an international conference held at Deutsches Klingensmuseum Solingen (the German Blade Museum), the volume provides fresh insights into the forms the sword can take, and the thoughts it inspires.

Lisa Deutscher and **Mirjam E. Kaiser** work in prehistoric archaeology, specialising in La Tène and Bronze Age swords, respectively.

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